Ted Kenneth Seastrom

Learning to Fly an Airplane

Insider information from a student perspective

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by

Ted Kenneth Seastrom

Final Edition

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Note:
The specific information in this book is out of date. This includes references to FAA rules and regulations as well as flight training best practices. Use this book only as a general introduction to and overview of private pilot flight training.

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Contents

Copyright 3
Dedication 4
Disclaimer 5
Who Should Read This Book 6
Preface 7
Using This Book 8
- Buckets 8
- Acronyms 8
- Citing Regulations 8
- Website Addresses 8

Come Fly with Me 9
The World of Aviation 13
- Aviation Culture 13
- Federal Aviation Administration 13
- General Aviation 14
- Aircraft Owners and Pilots Association 14
- GA Notables 15
- Web Resources 16

Pilot Certificates 17
Aviation Safety 18
Owning Your Progress 19
Flight Training Landscape 20
- Fixed Base Operators 20
- Flight Training Providers 20
- Accelerated Programs 21
- Flight Schools 22
- Certificated Flight Instructors 24
- Independent CFIs 27
- Discovery Flight 27
- Training Airplanes 29
- Time, Money, and Effort 31
- The Bottom Line 31

Getting Started 32
- Initial Requirements 32
- Medical Certificate 32
- Liability Insurance 33
- Legal Service Plans 33

What You Learn 35
- Checklists 35
- Regulations 36
- Stick and Rudder Skills 37
- Instruments 38
- Navigation 39
- Weather 41
- Radio Communications 42
- Air Traffic Control 43
- Airplane Systems and Equipment 44
- Airplane Performance 45
- Airplane Inspection and Maintenance 46

Physiology of Flight 47
Airports 48
Flight Planning 49
Autopilots 51
Emergency Procedures 52
Preparing for Flight Training 53
Flight Training Process 55
Ground School 55
Dual Instruction 55
Flight Training Devices 56
Flying Solo 57
Challenges 58
Fear 58
Fatigue 59
Overload 59
Delay 60
Budget 60
Your Flight School 61
Your Instructor 61
The System 62
On to the Finish Line 62
Private Pilot Certificate 64
Eligibility 64
Logbook Entries and Endorsements 65
Private Pilot Knowledge Test 65
Designated Pilot Examiners 67
Private Pilot Practical Test 68
Practical Test: Oral 68
Practical Test: Checkride 69
Now You're a Pilot 72
Currency 72
Proficiency 72
Additional Endorsements, Ratings, and Certificates 73
Slipping the Surly Bonds of Earth 75
Acronym List 76

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Dedication

This book is dedicated to:

* Every person who strives to be a responsible pilot.

* AOPA for preserving the freedom of General Aviation pilots.

* The FAA for keeping pilots, their passengers, and the public safe.

And to those of you who are thinking about becoming a private pilot.

Aviators everywhere have taken the journey you're about to begin. All of us want you to succeed.

Disclaimer

I am not a Certificated Flight Instructor (CFI). I am not an expert on anything having to do with aviation. What I bring to the table is that I got my private pilot certificate two years before writing this book. My memories are fresh. As a writer by trade, I feel qualified to put some words together in a book. That said, the information here is limited to my own personal experience and observations.

You are reading this book with the understanding that I am not rendering flight training, legal, accounting, or other professional services. If you require expert assistance, you should seek the services of a competent professional.

There is nothing in this book that will tell you how to fly an airplane. Any topic I bring up is for general discussion only. The definitive resource for any questions you have about aviation is first, last, and always the FAA. Its website, which is excellent, is faa.gov. Also see the Web Resources section of this book.

I don't want to get sued. So I'm not going to say anything even remotely critical about a person, business, or organization. Consequently, there are times when I will generalize or use hypothetical scenarios. I leave it to you to read between the lines.

Now that we have the legal stuff out of the way, there are two other matters to discuss before we get started.

First, flight training is steeped in tradition. I will do my best to avoid disclosing the time-honored rookie initiations that await you. But I will make you aware of key training milestones. If you're the kind of person who likes to be surprised, then you shouldn't read this book.

I mean that sincerely. Some people like to show up for a new experience and see what happens next. That's part of the adventure. On the other hand, some prospective pilots will want to prepare as best they can. After all, self-briefing is the first commandment of aviation: "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight." (14 CFR 91.103)

Second, I love aviation. I deeply respect the vast majority of people associated with it. That said, I do have a point of view. I will say things other pilots might disagree with vehemently. That's fine. If I give you something to think about, then I've done my job.

Who Should Read This Book

This book is for anyone who is thinking about becoming a private pilot, and for those interested in how pilots are trained.

Student pilots on a professional track may benefit in a general way. However, commercial aviation and its specialized training are not discussed.

The focus is on flight training in the United States, although many countries use a similar approach. International students who come to the U.S. to receive initial training will find some useful information. They should note that immigration and related legal requirements are not topics covered in this book.

Preface

From the time I was a little kid I wanted to fly an airplane.

If you're reading this book, then perhaps you've had those dreams as well. The question is, how do you turn those dreams into reality? Sixty percent of prospective pilots who start flight training drop out. They never make it to their private pilot certificate. (For more information, see the 2010 AOPA Flight Training Experience study at aopa.org.)

As a recent student, I believe you will improve your chances for success if you know more about flight training going in. You'll definitely have more fun and less frustration.

This is the book I wish I'd read before taking my first flying lesson. It's not about how to fly an airplane. Instead, it walks you through each stage of the training process. It warns you of the pitfalls and encourages you when facing unexpected challenges. It contains insider information from firsthand experience. Use it to get the most value for your time, money, and effort.

I'm going to be straight up with you. Learning to fly an airplane is the most challenging thing I've ever done. Even under ideal circumstances, it takes enormous stamina and commitment to succeed. You really have to want to become a pilot to meet the challenges that await you.

But know this: You can do it. Aviators everywhere will support you every step along the way. With this book, I will do everything I can to help you get started.

Ted Kenneth Seastrom
February 2012

Using This Book

This book consists of a several short topics that roughly follow the flight training process itself.

Buckets

When your flight training kicks in, absorbing all the information is like trying to drink from a fire hose.

To prepare you for this onslaught, I'm creating buckets and putting a little information in each one. This is to help you get started. Feel free to rename and rearrange the buckets any way you like.

My purpose is to give you a framework that makes you aware of certain concepts and give you a way of organizing the vast amount of information coming your way.

I'm not going to explain how to perform a task or how something works. That would be training, which this book does not provide. I do want to give you an idea of the kind of information you'll be learning, both formally and informally.

Acronyms

Aviation, like most industries, is chock-full of acronyms.

In most instances the first use of the acronym is defined. Some definitions are repeated if the context warrants it.

All acronyms are defined in the Acronym List section at the end of this book.

Citing Regulations

Most uses of the term "regulations" refer to Title 14 (Aeronautics and Space) of the Code of Federal Regulations. These FAA regulations are commonly known as the FARs (Federal Aviation Regulations).

A typical citation would be 14 CFR 91. Generally, the specific section is not included. This is to encourage you to get in the habit of looking up, and bookmarking, regulations in the FARs.

Please note that regulations change frequently, and consequently a particular reference in this book may be out of date. For current information, read the cited regulation at faa.gov.

Website Addresses

The format used for all website addresses is *domainname.com*. The "http://www" is left out.

Links to sites are not embedded, given the high probability of link breakage over time.

Come Fly with Me

To help give you some context, imagine a hypothetical flight. This detailed description is for illustration only.

Today you've decided to fly to Sunny Springs. You pour yourself a cup of coffee, fire up the computer, and click the shortcut to the Weather Channel's website. You get a weather overview for your home airport, your route, and your destination. You've been following the general conditions for a few days and already have a pretty good idea of what to expect.

Now it's time to get the actual and predicted weather for aviation use as well as pilot alerts, such as Notices to Airmen (NOTAMs) and Temporary Flight Restrictions (TFRs). Government sources are the only providers of official weather products. However, a number of commercial sites link to this information and integrate it into their online flight planning tools.

The most up-to-date information comes from a live briefer through a Flight Service Station (FSS). If you were filing a flight plan, or taking a longer trip, you definitely would get what's called a standard briefing.

Today's flight is relatively short, the weather is good, and you've flown the route several times before. So you can get everything you need from the flight planning tool at the Aircraft Owners and Pilots Association (AOPA) website, as well as the links it provides to official government sources. You create a simple Visual Flight Rules (VFR) flight plan but don't file it.

Even though you've flown to the Sunny Springs airport before, you still review the basic runway and airport information, either online or in the FAA Airport/Facility Directory (A/FD). You verify that the performance characteristics of the airplane match up with the demands of the route and destination. You scan through the airplane's checklist, paying special attention to the memory items of the emergency procedures.

Because you're a conscientious pilot, you take the extra step of running a Pilot-Aircraft-Environment-External (PAVE) checklist. In a nutshell, it reminds you to verify that this flight will be safe, given the current condition of the pilot (you), the aircraft you'll be flying, the environment, and any external pressures.

This whole process is what's called "self-briefing." By FAA regulation, "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight." (14 CFR 91.103)

It may seem like a lot of effort, but it only takes a few minutes. There are pilots who skip or gloss over it. But not you. As much as you enjoy flying, you accept the responsibility that comes with it. You read the accident reports and realize that pilot complacency plays too large a factor in many mishaps.

Time for the go/no-go decision. Today's trip is definitely a go.

You have something light to eat, get cleaned up, and drive to the airport 30 minutes away. This isn't a big international airport. It's a smaller local airport. In fact, you didn't even know it was there until you started taking flying lessons. This airport doesn't have a tower but it's fairly busy. There's a healthy mix of recreational flyers, business travelers, and even the occasional corporate and private jet.

Speaking of jets, you once were having a conversation with an older couple at the airport's Fixed Base Operator (FBO). You assumed they were waiting for their grandkids to fly in. But then they got into a Citation, occupied the pilot and co-pilot seats, and took off. Welcome to GA—it's a diverse place.

You rent an airplane from the flight school at the airport. This is where you got your training to become a private pilot. The airplane you rent is the same one you trained in. You're well acquainted with this airplane. But you still get to the airport a little early so you have plenty of time to do a thorough preflight.

You look at every item on the preflight checklist. Good thing you did. Turns out the airplane needed a quart of oil. Another 10 minutes and you're ready to go. Almost. One more scan of the airport to get a feel for what's going on.

Your friend Jill, who is not a pilot, is flying with you today. During your preflight planning, you included her in the weight and balance calculation to make sure the combination of airplane, fuel, passengers, and baggage falls within center of gravity limits.

Jill watched while you performed the preflight. She's flown with you before. You know that she's comfortable riding in a small airplane—which makes you comfortable flying with her. In fact, she's very good at spotting traffic. Looking for traffic is one of the things you cover in the safety briefing you give to every passenger.

You scan the preflight checklist to make sure you left nothing off, such as removing the pitot tube cover. Then you and Jill board the airplane, adjust the seats, put on the shoulder harness and seat belts, and close the doors. You're in the left seat as Pilot-in-Command (PIC). You quickly review the engine starting checklist, open the window, yell "clear," and start the engine. You scan the engine instruments to verify a good start. So far, so good.

You motion to Jill to put on her headset. Then follows a standard routine: Turning the avionics on and making sure you can hear each other through the intercom. Setting up radios and navigation aids. Checking the local weather advisory channel and noting the current wind conditions and altimeter setting.

Next you listen to the Common Traffic Advisory Frequency (CTAF) to find out which runway is currently in use. You don't hear any radio traffic, but you know the winds favor runway 17. You also noticed during the preflight that 17 is the runway everyone's been using.

After checking the free movement of control surfaces (ailerons, flaps, rudder, elevator, and trim) and testing the brakes, you announce on the CTAF that you're taxiing to runway 17 ("one-seven") from Airservice, the name of the FBO where you tied down.

As you taxi, you check the instruments to see if they're giving you reasonable indications. If something's not working right, it's easier to deal with it on the ground. Soon you get to the run-up area near the end of the runway.

Because you're flying a piston-driven airplane, you need to power up the engine and do a magneto check. If there's any roughness, you may need to burn off some fouled spark plugs. But this airplane is well maintained, and everyone who flies it follows the mixture leaning procedures.

You review the pre-takeoff checklist. You pull up near the runway entrance and announce on the CTAF that you're holding short 17. All along, you've been listening to the radio for other traffic. You scan the approach area one more time. Then it's "lights, camera, action."

You announce that you're taking off runway 17 and making a left downwind departure. You taxi onto the runway and line up with the centerline. One last check, and then you push the throttle all the way in, slowly.

You hold the centerline as the airplane builds up speed. At the designated rotation airspeed, you gently pull back on the control wheel, while adding increasing right rudder pressure to offset the airplane's left-turning tendencies. And you're off!

The airport sinks below you as you climb effortlessly into the sky. You're paying attention to a lot of things. But for a brief moment you remember once again why you became a pilot.

At the appropriate position, you announce and turn left downwind 17. You continue to fly up and out of the pattern. You announce that you're leaving the pattern and heading to the northwest.

As you climb, you scan for traffic, scan your instruments, and then review the climb checklist. Jill is also looking for traffic.

Once you're out of the terminal area, you switch to the center frequency and ask for flight following to Sunny Springs. The controller gives you a squawk code, which you tune into the transponder, and an altimeter setting, which you enter into various instruments.

Since you're flying VFR, you could squawk 1200 and not deal with Air Traffic Control (ATC) along the way. However, you like the traffic advisories and other services ATC offers.

After you level off at your cruising altitude of 6,500 feet (above mean sea level, not the ground), you run the cruise checklist. You lean out the mixture. Everything's in the green, and this is going to be a great flight.

Things are more relaxed now, so you can chat with Jill about where to go for lunch at Sunny Springs. But you're always scanning for traffic, always glancing at the instruments, always monitoring the radio.

Even though you're flying VFR, you fly with precision. You maintain altitudes and headings. You follow a flight plan that you created with the AOPA flight planning tool earlier.

You have a chart on your lap that you refer to as you pass various landmarks. That's called pilotage. What if the electrical goes out and you lose all your navigation systems? Knowing where you are on that chart and a little dead reckoning (time, distance, and speed calculations) will get you safely to the nearest airport. Besides, it's fun to know what you're looking at as you fly over it.

Fortunately, your airplane's navigation systems are quite reliable. Not only do they help you get from point A to point B, they also make it possible to fly the "highways in the sky" that are the backbone of the National Airspace System (NAS). This system of people, procedures, facilities, and equipment enables thousands of aircraft to share airspace across the country safely.

For example, your airplane's transponder assists with ATC's radar coverage. Ground-based transmitters and beacons send course signals to various instruments in the cockpit. Then there's the satellite-based GPS, similar to the one in your car, only a little more sophisticated.

Flying along, you leave one ATC sector and enter another. In the process you get handed off to a new controller. ATC says something like, "Cessna two-five-niner-echo-sierra, contact Alpha Center on one-two-six-point-seven."

As with most ATC instructions, you read it back. You switch frequencies, reestablish contact, and state your call sign and altitude. The new controller acknowledges radar contact and gives you a new altimeter setting.

You need to update the altimeter setting because the air pressure level changes as you travel around. By using the same altimeter setting, every pilot in the controller's sector has the same concept of how high 6,500 feet is.

Before you know it, you're getting close to Sunny Springs. It's time to stop the chitchat and prepare for the approach to landing.

You review the approach checklist. Since Sunny Springs airport is class Delta, it has a control tower. It also has a recorded airport and weather advisory broadcast, known as Automatic Terminal Information Service (ATIS). You listen to the ATIS on a second radio, because you're still monitoring ATC on the first radio, Com 1.

Alpha Center hands you off to Regional Approach. You switch and advise that you have information Bravo, the identifier of the latest ATIS broadcast.

About 10 miles out, Regional Approach has you switch to the Sunny Springs tower frequency. The tower controller tells you to stay north of the freeway and that she'll call your base. There are some airliners that want to land ahead of you. To expedite the flow of traffic when the call comes, the controller will have you enter directly on the base leg of the landing pattern and clear you to land. (A full pattern is downwind, base, and final.)

You're not announcing these pattern turns because the landing airplanes are sequenced by the tower. At non-towered airports, pilots announce on the CTAF and sequence themselves.

As you get ready to enter the pattern, you review the landing checklist, turn on the landing lights for visibility, slow down, and set flaps. Turning to final from the base leg, you put in the remaining flaps, and when you've got the runway made, pull power.

There's a crosswind, so you bank into the wind with ailerons while keeping the nose above the centerline with rudder pedals. You touch down on the right main wheel, then the left, adding more aileron correction as you slow down. The nose wheel settles gently onto the runway, and with light braking you slow down enough to comfortably take the first exit.

Welcome to Sunny Springs.

The tower tells you to switch to the ground frequency. You clear the runway, stop, and contact ground. While you're waiting, you raise the flaps, turn off the strobes and landing lights, and lean the mixture for taxiing. It's a warm day, so you and Jill open your windows and enjoy the fresh summer air.

The ground controller clears you to transient parking and gives you taxi instructions, which you read back as you do with all clearances.

You taxi to the parking location, review the engine shutdown checklist, switch off the avionics and lights (except the beacon), pull the throttle and mixture, and then turn off the master switch and ignition.

You insert the control wheel lock, close up the cabin, and put the cover on the pitot tube under the wing. You walk around the airplane to make sure the lights are off and everything looks okay. If you forget to turn off the master switch, the tail's red beacon light will be flashing—and the battery will be draining. Last, you chock the wheels.

Now you're ready for lunch.

The World of Aviation

Before we jump into the details of the flight training process, let's get a feel for the General Aviation (GA) ecosystem.

Aviation Culture

As a private pilot, you become an equal player with every other pilot in many respects.

I really got that when I taxied up alongside a Boeing 737 and my Cessna 172 was cleared first for takeoff. Flying the big jet requires more training, certificates, ratings, and hours. But the fundamentals of flight are the same, the rules are mostly the same, we talk to the same controllers, and we share the same airspace. Everybody starts out as a private pilot (at least in civilian training).

Aviation culture consists not only of pilots but also of FAA controllers, inspectors, and technicians; airport personnel; airplane manufacturers; highly specialized mechanics; flight schools and instructors; elected officials and opinion leaders; and many others.

Speaking as a newcomer, what strikes me about aviation culture is its contrasts. Old ways of doing things are combined with new technology. Rigid structure is offset by rugged individualism. Encouragement and support alternate with exacting accountability.

The progress of your learning process will be influenced by how well you acclimate to aviation culture. I suspect that a big percentage of those who drop out of flight training do so as much because of problems with the culture as with difficulty in learning to fly an airplane.

That's not to say aviation culture is negative or bad. On the contrary, it's rich and full of tradition. But it does have a certain texture, and it's vastly different than anything you've experienced before. To help you make this transition, I will be providing some insights from a new student's perspective.

Federal Aviation Administration

The FAA regulates aviation in the United States.

The FAA traces its origins to the Air Commerce Act of 1926. The purpose of that legislation was to encourage air commerce, issue and enforce air traffic rules, license pilots, certify aircraft, establish airways, and operate and maintain aids to air navigation.

The first aviation authority, the Aeronautics Branch, was created under the Department of Commerce. Later on it became the independent Civil Aeronautics Authority. Then it was split up and renamed. One part evolved into the Federal Aviation Agency, the other into the safety-oriented Civil Aeronautics Board (CAB).

In 1967, the Federal Aviation Agency moved under the newly formed Department of Transportation (DOT) and changed status from an agency to an administration. The CAB merged into the National Transportation Safety Board (NTSB), also under the DOT. The NTSB later became an independent U.S. government agency responsible for civil transportation accident investigation.

Today the FAA's mission is to encourage and regulate aviation. This dual role creates some conflicts. As a pilot, it can feel like you're dealing with a bipolar parent. Sometimes you're loved and encouraged. Other times you're severely reprimanded.

Flying an airplane exposes you to myriad rules and regulations. It's your job to know what's expected of you—and to be prepared for an enforcement action by the FAA if you do something wrong. However, the process is not one-sided.

On August 3, 2012, President Barack Obama signed into law the Pilot's Bill of Rights. This legislation guarantees pilots under investigation by the FAA expanded protection against enforcement actions. In particular, it grants pilots access to investigative reports, air traffic control, and flight service recordings. It also requires the FAA to provide the evidence being used as the basis of enforcement at least 30 days in advance of action.

Learning FAA regulations is part of your flight training. There are ways of making the process less painful. We continue that discussion in the Regulations section.

Don't be intimidated. As long as you understand the nature of regulation, you can have very productive interactions with the FAA and its representatives. The vast majority of them are dedicated professionals who truly want to help you.

General Aviation

As a private pilot, you operate in the subset of the aviation world known as General Aviation (GA). It's what's left over when you take out the military, the airlines, and scheduled cargo flights.

Within GA there are commercial and private elements. The commercial side includes anything where the pilot is paid to fly: unscheduled cargo, charter, corporate, flight training, and so on. As a private pilot, you cannot be compensated to fly an airplane, although you can share expenses.

Relatively speaking, private GA is less regulated. GA pilots fly mostly smaller airplanes in and out of the thousands of smaller airports across the United States.

GA does not occupy a separate airspace. It operates alongside the military and airlines, and shares most of the same facilities (except military air bases). As a private pilot, you can land at the Los Angeles International airport (KLAX)—although you're more likely to use a smaller nearby airport like Santa Monica (KSMO).

You can learn a lot about GA by attending one of the many airshows around the country. The leading GA event is the annual EAA AirVenture Convention at Wittman Regional Airport (KOSH) in Oshkosh, Wisconsin. It's simply called Oshkosh, and it's there you will experience the variety and vitality of GA.

Aircraft Owners and Pilots Association

As stated on its website, "The Aircraft Owners and Pilots Association, a not-for-profit individual membership association, effectively serves the interests and needs of its members as aircraft owners and pilots and establishes, maintains, and articulates positions of leadership to promote the economy, safety, utility, and popularity of flight in General Aviation aircraft."

In other words, AOPA's got your back. This group is all about protecting your rights as a GA pilot. But far more than that, AOPA offers an incredible range of services that make your life a whole lot easier.

You can go to AOPA's website for the details: aopa.org. Here's a small sampling of what you get as an AOPA member:

* Flight training information

* Online safety seminars

* Multimedia weather reports, airport directories, alerts, and other aggregated information services

* Online flight planning and filing tools

* Medical advisory services

* Liability insurance consultation and coverage

* Legal consultation and services plans

* Articles about buying and owning an airplane

But my absolute favorite AOPA service is the Pilot Information Center. You can email a question about anything having to do with GA, and this group will respond with a succinct, authoritative answer. To hold down their workload, I go to them only after my own research has been unsuccessful or inconclusive.

AOPA's services are what you see as a pilot. Behind the scenes, AOPA is the leading GA pilot advocacy group with legislators and government agencies around the country. Thanks to AOPA, usage fees and taxes are kept at a reasonable level. Regulations are scaled appropriately. And smaller airports are kept open and free of onerous restrictions.

Let's face it: GA is an easy political target. People see corporate moguls and rich celebrities traveling around in luxurious airplanes. Flying is not a poor man's hobby. But not all pilots are wealthy.

AOPA does an excellent job of balancing the interests of all GA pilots, from struggling students who scrape hours together one at a time, to middle-class pilots who fly for fun and business transportation, to the elite who jet across the globe.

In later sections, we'll talk more about how you can take advantage of AOPA's services. I say so many nice things about AOPA in this book that it might seem like I work for them. I don't. I do believe this is a truly valuable organization. A lot of people I respect feel the same way.

Also worth noting is AOPA's annual convention. As with Oshkosh, it's a great opportunity to learn what's new in GA, meet fellow pilots, and hobnob with some well-known and respected industry leaders.

GA Notables

As you get further into GA, you hear some names repeatedly. These are individuals who put a human face on GA. They appear in books, magazine articles, blogs, videos, seminars, industry gatherings, and other aviation venues.

One name is King, as in John and Martha King. They helped pioneer the private pilot home study industry. If you train at a Cessna Pilot Center, you will become acquainted with their King Schools materials. I've met John and Martha, and I'm proud of my signed copy of "Cleared for Takeoff."

Pilots on a commercial track sometimes prefer the Jeppesen materials, although they lack the folksy and friendly style of the King materials.

As an alternative, the FAA has free online library. Many leading GA pilots also offer their own series of training books. Rod Machado is one example. He's a great guy and actually replies to emails.

It's beyond the scope of this book to survey the landscape of GA's leading lights. I encourage you to take note of these names as you encounter them. They can teach you things that add depth and practicality to your pilot training.

Web Resources

The two most important sources for GA information are:

(1) **Federal Aviation Administration (FAA):** faa.gov
(2) **Aircraft Owners and Pilots Association (AOPA):** aopa.org

Following are other popular GA websites. This is a tiny fraction of what's out there. Only the top-level domains are listed. Take some time to explore what each site has to offer:

* **AirNav:** flight planning (airnav.com)

* **ASA:** supplies and training materials, especially good test prep guides (asa2fly.com)

* **Aviation Consumer:** evaluations of aircraft, avionics, accessories, and equipment (aviationconsumer.com)

*** Aviation Safety:** monthly journal of risk management and accident prevention (aviationsafetymagazine.com)

* **Aviation Weather:** National Weather Service (aviationweather.gov)

*** AVWeb:** industry news (avweb.com)

* **DUATS:** free government-sponsored flight planning service (duats.com)

* **EAA:** formerly the Experimental Aircraft Association but now much broader in scope (eaa.org)

* **FlightAware:** live flight tracking (flightaware.com)

*** Foreflight:** iPad flight planning app (foreflight.com)

* **Gleim:** supplies and training materials, especially good test prep guides (gleim.com)

* **Jeppesen:** supplies and training materials, mainly for commercial pilots (jeppdirect.jeppesen.com)

* **King Schools:** the leading name in GA training materials (kingschools.com)

* **LiveATC:** real-time air traffic control radio calls (liveatc.net)

* **My Pilot Store:** supplies and training materials (mypilotstore.com)

*** NAFI:** National Association of Flight Instructors (nafinet.org)

* **Rod Machado:** training materials and blog, column in "Flight Training" magazine (rodmachado.com)

* **Sporty's:** supplies and training materials (sportys.com)

I especially want to call out a great website called "Ask a CFI." This invaluable training resource is a free forum where CFIs answer pilot questions. Check it out: askacfi.com.

As time allows, look at various aviation publications, websites, and blogs. I like getting into the thought process of individual pilots. It helps me visualize flight scenarios.

A note of caution: Pilots can have very different ideas about how to handle certain situations. If you're not careful, you can find yourself getting whipsawed around a flight concept, leading to utter confusion.

My advice is to avoid getting mired in frivolous debates. The value of the reading material is that it makes you aware of knowledge areas and exposes you to different points of view. In this book I use the analogy of creating, labeling, and filling buckets. If you run into an interesting topic, create a bucket for it, and then set it aside for discussion with your instructor.

Pilot Certificates

There are three entry-level pilot certificates. You train for them starting from scratch, and when you're done, you get to fly an airplane without an instructor by your side.

In addition, there is the student pilot certificate, which is combined with your first medical certificate. Along with the proper endorsements, the student pilot certificate enables you to fly solo under specific, limited circumstances during the time you are actively training.

The categories of pilot certificate available to the beginner are sport pilot, recreational pilot, and private pilot. In general terms, the difference is the type of airplane you can fly and when. There are also differences in the amount, type, and difficulty of training and testing—as well as the medical certification required.

For a detailed discussion of the requirements and privileges associated with each type of certificate, see the FAA regulations in 14 CFR 61.

The private pilot certificate is the hardest of the three to get. It takes the most time. It costs the most money. It also has the most privileges.

I made the decision early on that the advantages of getting the private pilot certificate outweigh the differences in time, money, and effort to get the limited certificates. And besides, why go through all this effort only to end up with half a loaf? The exception would be if you want to avoid a stricter medical review. Or if you know that all you'll ever do is some light recreational flying.

Not to confuse things, but private pilot certificates come with different ratings. In this book, we're going to assume you're learning to fly a land-based airplane with one engine. When you get your private pilot certificate, it will have an Airplane Single Engine Land (ASEL) rating.

Other ratings you can get are the instrument, multiengine, and sea ratings. These are ratings, not certificates. Think of them as add-ons to your private pilot certificate.

For ratings beyond the private pilot ASEL, see the Additional Endorsements, Ratings, and Certificates section at the end of this book.

Aviation Safety

Captain A. G. Lamplugh, chief underwriter for the British Aviation Insurance Company, made this famous observation years ago:

"Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity, or neglect."

This is one of two aviation quotes I have in my personal flight journal. I share the other one with you at the end of this book.

So let's talk about safety.

I feel safer in an airplane than in a car. People who fly airplanes are well trained and thoroughly tested. They operate machines that are made of the highest-quality parts and are subjected to rigorous maintenance inspections at frequent intervals. The industry is overseen by regulators who won't hesitate an instant to pull a certificate and ground a pilot or an airplane.

That's the "not inherently dangerous" part of Capt. Lamplugh's quote.

Reading the accident reports, you realize some pilots push the boundaries. That's "carelessness." Or they try to fly in conditions they aren't proficient enough to handle. That's "incapacity." Or they postpone required maintenance. That's "neglect."

As you embark upon your flight training, keep foremost in your mind that safety is an attitude. Don't become a victim of "carelessness, incapacity, or neglect."

Owning Your Progress

Most of the people in the flight training industry are decent and honest. Most of them will accommodate your needs as best they can.

Most of them will also be quite pleased if you go with the flow: Fly the first airplane they show you. Train with the first CFI they introduce you to. Pay in advance. Adapt to changes in schedule, airplane, and instructor without complaint. Hold the questions to a minimum.

It's human nature. That's why you need to "own" your training progress.

You can't control the process, because you don't know how to train yourself. But as you read the sections of this book, you can acquaint yourself with what happens during flight training. Use that knowledge to ensure your progress fits your time, budget, and ultimate goals.

Flight Training Landscape

In the following sections, we meet the individuals and businesses who will play a role in your flight training, directly and indirectly.

Fixed Base Operators

An FBO is any aeronautical business permitted to operate at an airport and provide aviation support services. These services may include one or more of the following: fueling, hangaring, tie-down, aircraft rental, aircraft maintenance, and flight instruction.

By definition, a flight school is an FBO, although not all flight schools are located at the airport. And not all flight schools have their own fleet of rental airplanes. Those that don't almost always make arrangements with other rental providers to give you access to an airplane.

The term "FBO" is most often associated with a business that is limited to providing fueling, tie-down, and hangaring. These operations range from bare-bones self-service islands to luxurious facilities that resemble exclusive clubs.

The nicer FBOs offer high-quality snacks, food, and beverages; a fully equipped pilot's lounge; premium rental cars; and a concierge you can contact from the air who will make hotel reservations and other arrangements for your visit.

This is how the elite travel. Private jets and turboprops. No hassle with the Transportation Safety Administration (TSA). They pull up to their Citation X in a Lincoln Navigator and are greeted at the stairway by the captain.

The nice thing is any GA pilot can travel with much the same convenience and comfort. Substitute a Cessna 172 for the Citation X, and a Toyota for the Lincoln.

FBOs come in two varieties: chain and independent. Chains include names such as Signature and Atlantic. Corporate fleets, charter operators, and even the military have nationwide fuel and service contracts with these big FBOs.

The smaller independents vary in quality and services offered. They have real character and individuality. They are owned and operated by people who've been at the airport a long time. If you're nice to them, they let you hang out on the patio while sipping iced tea, listening to radio calls, watching traffic, and chatting with pilots and airplane owners. These local FBOs can be one of your most important connections to GA.

In this book, I use "FBO" to refer to the pilot service businesses just described. I call flight schools "flight schools," even though they are also FBOs. I make this distinction because you will sometimes hear flight schools referred to as FBOs.

Flight Training Providers

Who is going to teach you how to fly an airplane? In this section, we'll look at all the possibilities, although only a few make sense for the typical GA private pilot.

If you want someone else to pay for your flight training, your best option is the U. S. government. First on the list is the Air Force. Other branches of the military with aviation services include the Army, the Coast Guard, the Marine Corps, the National Guard, and the Navy.

Time was when most commercial pilots came from the ranks of the military. Then someone figured out that it was worth offering incentives to keep these highly trained pilots in the service longer. So civilian-trained pilots filled the gap for the airlines.

This trend may be reversing. But that is only relevant to commercial aviation. The closest most GA pilots will come to military aircraft is seeing an F-16 on the ramp, which is really cool. Or being intercepted after accidentally flying over the White House, which is not so cool.

Many would argue that military flight training is the best. It's certainly the most cost effective. You get to fly a lot, and someone else is paying for it. Although due to stringent requirements, it's the least accessible type of training. Then there's the small matter of owing the government a chunk of your time, not to mention putting your life on the line. Nonetheless, if you're young enough and want to make aviation your career, the military offers some great opportunities.

A civilian alternative to the military would be the flight training universities. A leading name in this category is Embry-Riddle Aeronautical University. As its name implies, it offers both academic education and flight training. There are also regular universities that have well-respected aeronautical programs.

If you want to work for the airlines, universities with flight training are some of the best places to go. They are easier to get into than elite military aviation programs, and they don't have formal age limits. Nonetheless, their programs are still intensive and best suited to younger people who want to pursue a career in aviation.

A step down the food chain would be the flight training "academies." These are the places that take you from zero to commercial pilot with a multiengine rating in 90 days. They make you pay a very large sum of money up front. And there's a catch: They don't offer academic education. That can be a problem given that most airlines want you to have a college degree.

Let's suppose you are the typical private pilot candidate who isn't going into the military, an aeronautical university, or a flight training academy. You have two options, which are really one option in two forms.

Any way it goes, you will receive your flight training from a CFI. Your CFI will work independently or through a flight school. If independent, the CFI will either have her or his own airplane, or use yours—which you either own or rent. If working through a flight school, the CFI and you will fly the school's airplanes.

One distinction to make here: Your typical flight school operates under Part 61 (14 CFR 61) rules. There are required knowledge areas, but the method and sequence of instruction are left up to the school. The formal programs operate under Part 141 (14 CFR 141). These regulations demand a more rigid training structure and curriculum. But in return, less flight time is needed to meet the certificate requirements.

International students are required to train under Part 141 to get a student visa for extended stays. Foreign nationals can train under Part 61 with certain conditions. See the Initial Requirements section for more information.

We'll look at how to find and evaluate CFIs and flight schools in your area in later sections. These are the traditional providers of flight training for private pilot students in GA.

Accelerated Programs

Before we dig deeper into the traditional approach to flight training, let's take a brief detour. Consider the small group of flight training providers that specialize in accelerated training.

Search the Internet and you will see claims that you, too, can learn to fly in a week, or 10 days, or two weeks, or whatever. Is this for real? Can it be done?

The answer is a very qualified "yes."

The type of certificate makes a time difference. For example, the requirements are less stringent for a sport pilot than for a private pilot. Since the focus of this book is the private pilot certificate, let's start with that premise.

Because these are Part 61 (14 CFR 61) training programs, we're talking a minimum of 40 hours of flight time. Can you fly eight hours a day? Five? More than three? So maybe 10 days seems more reasonable.

Then there's the ground school to prepare for the FAA knowledge test (aka written exam) and oral exam. Most of these programs won't let you start until you've passed the written exam. So let's call that 20 to 40 hours of your own time, depending on how fast you learn.

There is a certain logic to it. As we explore in later sections, there are real advantages to greater intensity and structure. If you have the capacity, you retain more, learn better, and waste less time getting back up to speed than when lessons are spaced further apart. So it is doable, and people do it. Their certificates are as valid as anyone else's.

But . . .

Learning to fly an airplane is one training process you don't want to rush. It takes time to acquire knowledge and build skills.

There's a difference between cramming for the test and understanding something. Real understanding goes down to the genetic level. It's accessible in high-stress and emergency situations. You don't have to think about it—you know it. How quickly can you reach that level?

It's the same with skill building. You are controlling a fast moving machine in a three dimensional space while:

* Scanning a complex panel of instruments and gauges.

* Navigating changing terrain and charted airspace.

* Listening and talking to ATC.

Can you learn all that in 10 days?

There might be one exception. You've passed the written exam and completed most of the flight training requirements. Because of scheduling and other reasons, you're not getting the private pilot certificate finished. Taking a week to push it through might make sense.

Ultimately, I had to do something like that to finish my private. I took some time off from consulting and flew nearly every day. It wasn't part of an accelerated program, but the concept was similar.

Flight Schools

Flight schools are venerable institutions in aviation culture. At one time, nearly every airport large and small had one. But many died off during the Great Recession. Actually, a lot of them started fading away before that, because of poor management, undercapitalization, and high operating costs.

Frankly, I don't see how anyone makes money running a flight school. The ones that hang on are really dedicated. Running a school is also a nice way to pay for a flying habit if the owner doesn't want to be an airline, cargo, charter, or corporate pilot.

Flight schools bring together CFIs, airplanes, and students. Some have their own rental airplanes, others don't. Flight schools are generally run by pilots. Not all pilots are good business people, even if they are well intentioned.

Some flight schools are professionally run operations. Others are felonious scams that shamelessly destroy student pilot dreams. If that sounds extreme, search the Internet for "flight school rip-offs." Fortunately, it appears the worst of this bunch has gone out of business. But you still have to be cautious.

Sizing a school up can be difficult because, in the beginning, you don't know what to look for. The things that impress you the most when you walk in the door may not really matter. So how do you decide?

Unless the school is dishonest or very poorly run, the most important factor is finding a good CFI. The school's role in that is the selection of CFIs it offers you. As for evaluating CFIs, you will find that discussion in the Certificated Flight Instructors and Independent CFIs sections.

The next factor is the quality of the rental airplane fleet. A more detailed discussion can be found in the section about Training Airplanes. But looking at the fleet as a whole, are the planes newer or older? Is there a range in pricing and sophistication? What is the availability of the airplanes, and how is scheduling handled? If the school offers online scheduling, it gets extra points. What's the cancellation policy?

Ask to be shown the planes you will fly. When you get back to the office, ask to see the maintenance records for those planes. If you get any static or delay, say thanks and walk away. Trust me on this. As they say in poker, responses to questions like this are a real "tell."

What about insurance? We dig into that topic in the Liability Insurance section. In general terms, ask what is covered and whether you can see the plan as well as current proof of insurance. Same as with the maintenance records. No show, you go.

Have there been any accidents or fatalities in the past 10 years? If so, ask the school to describe what happened and how they handled it.

Then dig into how the training is conducted. Is there a set curriculum? Can you see it? How is ground school handled? See the Ground School section for more on this topic.

Ask about their performance. How many current students are there? How many students have taken the private pilot practical test (aka checkride) in the past 12 months? How many of those passed? How does that break down by instructor?

Finally, what's the payment plan? Beware of prepaid programs. They were a favorite ploy of the scammy schools that are now out of business. Maybe keep $1,000 on account to get the block rental and instructor rates. But not a dime more. Flight schools go out of business all the time. Never put down more than you're willing to lose.

If asking all these questions makes you uncomfortable, I understand. Why rock the boat? Everybody's being so nice to you.

To start with, you're investing upwards of $10,000 and more than 100 hours of your personal time (flying and studying). That's a lot if you don't succeed—or even if you do, but the progress is slow and the process is full of frustration.

But the bigger point you should never forget is that you're the one with the money. You have every right to ask questions and get the information you need. You would do that if you were buying a car. Well, there's a lot more at stake in this situation.

After meeting with people at the flight school, broaden your research.

Start hanging out at the FBO and striking up conversations, especially with pilots. Keep in mind that having a flight school next door might bias comments toward the home team. That's okay. Somewhere along the way, you should find pilots willing to offer an objective opinion.

Definitely talk with more than one school—even outside of your area. You will gain real insight from each conversation. Make comparisons. Ask open-ended questions: "What makes your school different?" Then read between the lines.

While selecting flight schools, you need to be aware of their limitations.

Your local flight school is best suited to providing primary flight training—i.e., preparing you to become a private pilot. Getting advanced certificates and ratings is a different matter.

For example, to get your instrument rating it's advantageous to train near airports that have a variety of instrument approaches. If you have to fly an hour and back to shoot a precision approach, that adds up to an additional two hours of airplane and instructor expense with minimal value.

To get a multiengine rating, you need to have access to rental multiengine airplanes. Twins are not something you typically find in the small flight school's fleet. Ditto the complex trainers (retractable gear) that you need for the commercial certificate.

It's not uncommon for pilots to get their private certificates at the local flight school, and then move to a more specialized training environment after that. The topic of advanced training is beyond the scope of this book—and my own personal experience. Although, as I write this, I am working on my instrument rating. Perhaps I might have more to say about that down the road.

Certificated Flight Instructors

For a certain period of time, your CFI will be the most important person in your life.

This is the person who will initiate you into the rituals and secrets of flight. This is the person on whom your life will depend in a variety of challenging circumstances. This is the person whose initial example will mold you as a pilot, whose good and bad habits will follow you for the rest of your pilot career, whose encouragement will sustain you, and whose neglect will cost you time and money.

Finding the right CFI is the single most important choice you will make in aviation. So who is this person? Let's consider a few hypothetical profiles.

CFI #1 is fresh out of a flight training academy. At age 23, he has more than 300 hours of total flight time and around 30 hours of instructor experience. He's building time to qualify for an entry-level airline job—assuming he ever gets his degree. He doesn't really enjoy teaching and would never consider it as a career. He's a decent pilot but hasn't flown much beyond the minimum requirements.

CFI #1's lack of maturity shows when he's late or cancels lessons at the last minute. He gets frustrated when you don't do something right, and lets you know it. He doesn't handle surprises well. He hates teaching any ground school and acts put-upon when you ask him questions.

As far as CFI #1 is concerned, you could take lessons forever and never get the private pilot certificate. It's money in his pocket and hours in his logbook. Every lesson starts out with "So what are we going to do today?"

CFI #2 is a woman in her mid-30s. She has more than 3,000 hours of total flight time, 1,000 of which are instructor time. She worked for a regional airline and then decided she preferred instructing. Every year she signs off at least a dozen students for the private pilot checkride. Her pass rate is over 90 percent. She is kind, patient, and thorough.

CFI #2 follows a set curriculum that she's constantly updating and improving. Nothing surprises her. She's been in every kind of flying and training situation imaginable. She knows at all times exactly where you are in the training process. She knows what you're going to do—and she lets you, to see if you can catch your own mistakes before she has to correct you.

When you fly with CFI #2, you feel safe yet completely responsible for flying the airplane yourself. As long as you're willing to work hard, she will spend whatever time it takes to explain a concept or teach a maneuver. Even though you're 10 years older, you look up to her.

CFI #3 is a true aviation veteran. He has more than 25,000 hours. He's a former corporate and cargo pilot who's flown around the world dozens of times. Even though he's over 65, he's still sharp as a tack. He does get a little hesitant on the radios every once in a while. But talk about experience. This man could fly a Falcon 900 in his sleep.

CFI #3 knows what real-word aviation is all about. Since retiring a few years ago he decided instructing would be fun and a great way to keep flying. He doesn't appear to follow a curriculum. He likes to get in the airplane and see what shows up. But you have to give him credit. He cleaned up your landings and demonstrated some pretty slick maneuvers.

Like when CFI #3 put the airplane in a spiral dive. "Don't break them wings," he chuckled as he talked you through the recovery procedure. He's great at all the practical aspects of flight planning and airplane management. Heck, he's even an Airframe and Powerplant (A&P) mechanic. You can really learn a lot from this guy. Just got to make sure you're staying on track with the training program.

Let me drive this point home. These examples represent three common categories of CFI:

* Pilots who are inexperienced and don't enjoy instructing but are doing it to build hours

* Pilots who are experienced, love instructing, and are dedicated career CFIs

* Pilots who are very experienced and turn to instructing as a supplemental or late-career activity

The three things these CFIs have in common are (1) They are legally qualified to instruct you, (2) they each charge close to the same hourly rate, and (3) if you can adapt to their style of training, they can each get you trained for the private pilot certificate.

In the U.S. system, many pilots on a professional track build their hours by becoming CFIs. More than a few of them are not good instructors, don't like instructing, and, if younger, may lack basic maturity and professionalism. In my outsider's opinion, this farm-team structure—not the cost of training—is the major cause of the outrageously high student dropout rate of 60 percent.

There are outstanding young instructors. Many beginning instructors do love aviation and take their jobs very seriously. But as notable as these exceptions are, I still think the CFI pool should be limited to people who have a lot of experience and are dedicated to flight training as a career.

Instead of forcing pilots to become instructors to build hours, some countries have used what's called an *ab initio* system. Newly licensed pilots are brought in "from the beginning" and trained by the airlines. This might be a better way to go.

The problem is, politicians are responding to public concerns about pilot training by increasing hours requirements for airline jobs. This concern was heightened after the Colgan Air accident in 2009, where the pilots seemingly didn't know how to handle a simple stall.

But is adding hours for beginning pilot jobs the answer? Do students learn more if the school day is longer? Or do they learn more if the teacher is better? I would argue that the hours logged by an inexperienced CFI building time are worth much less than the equivalent time spent in a rigorous industry training environment that sets controlled, measured, professional standards from day one.

So what should it take to become a CFI? There should be a high overall flight time requirement. You should have a lot of experience being a pilot yourself before you are allowed to teach someone else how to be a good pilot.

I know I've gone off the ranch with this rant. But it's important that you develop a perspective on the training environment you're entering. That's why I insist that picking the right CFI is so essential.

So what should you look for in a CFI?

I'll suggest some questions to help get you started. But keep in mind that you won't know what an instructor is really like until you fly together the first time. More on that topic in the Discovery Flight section.

Here are some questions I would ask:

* How many total flight hours do you have? What kind of flying? Have you ever had any suspensions?

* Why are you an instructor? Instructor hours?

* May I see your current pilot certificate and medical?

* Do you have a curriculum and how do you work with it? Can I see it?

* How many private pilot checkride signoffs have you had in the past 12 months? Pass rate? Average number of training hours per student?

* Do you have another job, flying or other? How often do you cancel/reschedule lessons to accommodate work, school, and other obligations?

* It is my goal to (outline your desired flight training schedule). Do you think this schedule is reasonable, and can you commit to helping me achieve it?

Finally, turn the table. Ask the CFI if he or she has any questions for you.

If I were your CFI, here's what I'd want to know: Why do you want to fly? What do you plan to do with your private pilot certificate? What are your biggest concerns? Do you have any friends who are pilots? Have you ever flown in a small airplane before? Have you trained with anyone else? If so, for how long and how did it go? You learn a lot about people from the questions they ask.

As for finding CFIs, a good place to start is the National Association of Flight Instructors (NAFI) at nafinet.org. There are roughly 90,000 certificated flight instructors in the United States. Of that number, around 3,000 belong to NAFI. By doing so they have further embraced the responsibilities of flight instruction and committed themselves to the highest professional standards.

Independent CFIs

An alternative to going through a flight school is to work directly with an independent CFI. Keep in mind that, either way, you're getting your training from a CFI. The difference is customization and flexibility. And maybe a higher caliber of instructor.

When you go through a flight school, it has its own stable of CFIs and fleet of training airplanes. It's a great business model when all the right elements are in place.

But here's the problem. Have you ever gone to the Grand Canyon and taken a donkey ride? Those donkeys have been down the same trails a thousand times. It's safe and mildly enjoyable if you've never done it. But it's not exactly a rigorous trailblazing experience.

Some flight schools are like that. They give donkey rides in the sky. Their instructors are happy to take you flying whenever you want. Some training goes on. Every once in a while, somebody gets a private pilot certificate. But most students come and go without much to show for it. You know it's a donkey school if the CFIs spend a lot of time sitting around like bored ranch hands.

Would an independent CFI offer a better experience?

An independent CFI works directly with you. Scheduling should be somewhat easier, although a good CFI will be busy. More customization is possible because the CFI can train you the way he or she wants to, without the influence of flight school management. That can be a good thing if the flight school has mediocre training standards.

Oftentimes the best people in any field prefer to work on their own. They insist on excellence and don't need to compromise to stay employed. But not all independent CFIs fit that profile. Among their ranks are some of the worst instructors—not even a bad flight school would employ them. So, as with all things, you've got to do your homework.

When you work with an independent CFI, everything is à la carte. The CFI may have her or his own airplane, but probably not. You have to handle finding an airplane, getting insurance, and more. Some flight schools have rental planes they will let you use for training with approved CFIs.

An experienced independent CFI with a professional attitude should help you with the logistics. If you get a remark like "All I do is instruct. Everything else is on you," I'd find someone else.

Finding a good independent CFI will take time and effort. But if you have your own airplane and some patience, this might be a very desirable option for you.

Discovery Flight

Have you ever gone into a pet shop and seen a cute puppy jump up and wag its tail when you walk by? The shop owners are smart. Without missing a beat, they take that adorable creature out of the cage and let you hold it. Next thing you know, they invite you into the bonding room. If you walk into that room, it's over. You're going home with a new pet.

It's not surprising that the discovery flight is a time-honored flight school ritual. Like dog lovers, those of us who love airplanes are an easy mark. Walk us out to the ramp, open the cabin door, and were smitten.

During the discovery flight a CFI gives what is essentially a mini-lesson. For most people, there are a lot of "firsts" in this experience:

* Walking into the open area where the airplanes are parked.

* Seeing an airplane cockpit with its dizzying array of instruments, gauges, and controls.

* Hearing loud engine noises.

* Wearing a bulky headset while listening to pilot-speak on the radio.

* Taxiing close to the ground.

* Taking off and flying in a small airplane.

The discovery flight will also be your first experience with a CFI.

I remember my first discovery flight, 25 years ago. For a variety of reasons, I stopped flying after three lessons.

It was in a Cessna 152, at a rural Indiana airstrip, with a CFI who was a grizzled Army veteran. We were ready to take off, and he told me to push the throttle all the way in. How can that be? I didn't know anything.

"Push it in," he barked. So I pushed the throttle in about halfway, and the airplane started moving. "Push it all the way in." At this point the CFI was done wasting time, so with my hand still on the throttle, he reached on top and pushed it all the way in. The engine roared to life and we began barreling down the runway.

I confess to feeling equal parts terror and excitement. But more than anything, I didn't want to mess things up. "Pull back" was the next instruction. And I did.

The airplane went smoothly up into the air. We were flying! But next thing you know, we started veering off to the left—caused by what I later learned are left-turning tendencies during takeoff. "More right rudder, more right rudder." And so began my first lesson, aka discovery flight.

All nostalgia aside, there are some important things for you to learn from the discovery flight.

If you become panic stricken, wet your pants, or throw up, you might think twice about becoming a pilot. However, you should know that people have had each of these experiences and gone on to become confident, proficient, and safe pilots. It's also possible that you had a bad reaction to your CFI.

Which leads to the next point. I'm 99 percent certain you'll enjoy the discovery flight, like you'll bond with that cute little puppy. But what's really going on here is that you're selecting a CFI.

You don't have to overthink it. Check your gut. If you have the slightest doubt, thank everyone and say you'll get back to them with a decision in a day or so. The right answer will come to you.

If that answer is no, then ask to try another CFI. If the owner of the school gives you a hard time, move on. If the owner is the only instructor, move on. If you're working with an independent CFI, find another one.

Keep looking until you find the right CFI, no matter how long it takes—even if you have to postpone training for a period of time.

Get the wrong CFI and you probably won't get your private pilot certificate. Or if you do, there will be a lot of issues with your training—issues you will spend time, money, and effort fixing down the road.

Training Airplanes

The biggest expense in your flight training will be buying or renting the airplane you fly.

Let's first look at buying your own airplane. It takes a lot of the hassle out of flight training. An airplane will always be available when you need it. That's a great advantage if you want to maximize flexibility and minimize training time.

This will be a very high-level, general discussion. If you're going to buy an airplane, there's a lot research to be done. Plenty of articles and books have been written on this topic. But we can look at some key issues.

How much airplane do you want to buy? There are plenty of stories out there about students having a rough time because they bought high-performance (more than 200 hp) and/or complex (landing gear) airplanes as trainers. Would you want to learn to drive in a race car or a big truck?

So what constitutes a simple trainer airplane? Assuming you're going for the private pilot certificate and won't be flying light sport planes, then you're looking at something like a Cessna 172 or perhaps a Diamond DA-20. There are some older Pipers out there, but I would personally avoid them if you have the money.

Suppose you buy new. As of this book's publication date, you'll spend between $250,000 and $350,000, or even more if you get every bell and whistle. Plus insurance. Plus gas. Plus maintenance.

With your own new airplane, you have the assurance that it's in peak condition—and hasn't been banged up by other students. It will also have the latest avionics package.

If you want to cut costs and game your taxes, you can lease your airplane to the school and give yourself priority access. But be aware that your precious new gem may get kicked around.

A variant of the have-your-own-airplane option is to buy used. You still get the scheduling advantages. But you will spend more on maintenance. And your cockpit may be out of date.

Let's look at what's in the cockpit.

Older planes tend to have older-style mechanical instruments. You will hear the expression "steam gauges." These are instruments and gauges with round analog dials. The standard set is called the "six pack": airspeed indicator, attitude indicator, altimeter, turn coordinator, heading indicator, and vertical speed indicator.

There are engine-related gauges. There will be at least one communication radio. And there will be navigation equipment, such as a VOR, ADF, DME, and transponder. Most GA airplanes today also have a GPS. (See Acronym List for definitions.)

Newer planes, and older planes that have been updated, have what's called a "glass cockpit." Large LCD screens simulate updated versions of traditional instruments. These displays are driven by digital flight systems rather than mechanical gauges and linkages.

This wealth of information comes at you like an intense video game. In fact, the glass cockpit is so eye-catching that some critics argue it distracts you from your primary duty of looking outside for terrain and traffic.

From a student perspective, there are trade-offs and choices to be made.

The simpler the plane's instrumentation, the easier it will be to learn to fly. Indeed, in primary flight training, most of the focus is on "stick and rudder" skills. You're developing a natural feel for the operation and limitations of the airplane.

The real instrument work comes in when you pursue your Instrument Flight Rules (IFR) rating. That's what allows you to fly in Instrument Meteorological Conditions (IMC)—when you can't see anything outside the cockpit.

The glass cockpit is becoming the standard. If you're capable of learning it now, consider doing so. Note that when you take your practical test checkride, you will be tested thoroughly on your knowledge of these advanced instruments and their many features. That raises the bar for passing, and possibly your stress level as well.

This conversation also applies to renters. The only difference is that your school's rental fleet may not include an airplane with a glass cockpit. That's fine. You can always learn to use it later on.

So let's talk about renting. Most private pilot students rent. Even if you have the money to buy, you might decide to rent at first to get acclimated.

One variation of renting is leasing. Many airplanes are tied down and unused a good deal of the time. Maybe the owner doesn't fly much anymore. Or perhaps the owner is having financial problems and can't afford to fly right now (and may be postponing needed or even mandatory maintenance).

If you're going to fly a lot during a fixed period of time, leasing might make sense. Be advised that you are taking a risk. It could be the best or worst of both worlds (owning and renting).

For the remainder of this book, I'm assuming you'll be renting hourly through a flight school. It's a simpler proposition, especially if you have to stop flying for a while.

Rental airplanes tend to be older and less equipped. If used as trainers, they've experienced their share of hard landings. That doesn't mean they're unsafe or inadequate. It is important that you do a thorough review of the maintenance logbook of every airplane you fly. As a student, you're not required to do this until you take the practical test. But it's a good habit to get into now.

A reputable school won't hesitate to show you the logbooks of its rental fleet. Reluctance to show maintenance and insurance records is a telltale sign of a flight school on its way to bankruptcy.

Another good habit to get into is to keep a maintenance and inspection recap for every airplane you fly. When's the next annual due? The 100-hour? Pitot-static check? Oil change? Time before overhaul (TBO)? A good school will have this information posted prominently on a whiteboard. Follow it to see if entries change as various dates pass.

Do most students make this effort? No. But then most students never finish their training, either. What makes you different is that you decided to be a conscientious pilot from day one.

One more word about rental planes. My advice is to fly the same airplane every time if you can. Or at least fly the same make and model of airplane. Each airplane has different performance characteristics. You will become a proficient pilot much quicker if you learn to "fly by the numbers." That means you know what power settings and control inputs are needed to produce a consistent set of results.

Some might argue that you will be a more well-rounded pilot if you can jump into any type of airplane and adapt. That might be true when you're more experienced. In the beginning, don't confuse yourself. The school may prefer

that you fly whatever airplane happens to be available that day. But my advice is to fly the same airplane whenever you can.

Final tip: Adjust your seat to the same height every time. Crank it up all the way to the top, then crank it down a set number of turns. That ensures you have a consistent sight picture, which will help with visual references for flying and landing.

Time, Money, and Effort

There's no way around it. It takes time to learn to fly an airplane properly. And it takes a good chunk of money. How much depends on a variety of factors.

If you're getting a private pilot's certificate under Part 61 (14 CFR 61), the minimum mandatory flight time experience is 40 hours. With the exception of the accelerated programs, most people take longer—some twice as long. And that doesn't include the time you spend studying, much less driving back and forth to the airport.

The key is how intensively you can pursue your training. If you fly once a week for an hour, it will take a long time to build proficiency. The first part of every lesson will be spent getting back up to speed. If, on the other hand, you fly two hours at a time, three times a week, your progress will be faster. It will take fewer hours to get ready for the checkride, and you will accumulate those hours in less calendar time.

The time element depends on how much you have available, and how flexible your schedule is. But there's also a burnout factor. Learning to fly an airplane is demanding, physically and on many other levels. You need time to absorb what you're learning, and to recover from the stresses of training. That's where effort comes in.

The younger and fitter you are, the more resilient you'll be. That said, age does have its advantages. After 40, you may be slower. But you're more focused and more disciplined. Because you have to conserve your energy, you learn how to do things more efficiently. Like the story of the tortoise and the hare.

The cost depends mostly on time. Do the math. Hours times rental rate plus instructor fee. The cost goes way up if you have to stop and restart a few times. The cost goes way down if you can bang it out.

The Bottom Line

If time and money are no object, go with the flow. You'll get there when you get there.

But if you want to get your private pilot certificate within a certain timeframe and budget, you're going to have to push yourself. You will be stretched beyond your comfort level. You'll make compromises and trade-offs, especially if you're juggling work and family obligations.

The more you know going in, the better you will use your time, money, and effort. The more committed and focused you are on your training, the more you will increase your chances of success.

Make flight training work for you. Everyone has an agenda. You are the keeper of your agenda. Respect those with more knowledge and experience, but don't be intimidated by them. Keep asking questions until you're satisfied with the answers.

Getting Started

Before you start your flight training, you must meet some initial requirements you need to meet. You also want to do your homework when it comes to medical, insurance, and legal services.

Initial Requirements

There are regulatory requirements to be permitted to receive flight training in the United States. There are other requirements to be eligible for the private pilot certificate.

If you are a U.S. citizen, you can go on a discovery flight before starting pilot training for a new certificate or rating. When you take your first official lesson, you have to establish proof of citizenship by showing the flight school your U.S. passport or birth certificate.

This is a TSA requirement as part of its Alien Flight Student Program. Foreign nationals are subject to numerous special requirements. For more information, go to the Alien Flight Student Program website (flightschoolcandidates.gov) as well as the main TSA website (tsa.gov).

If you are not a U.S. citizen, you should carefully review the relevant regulations. You need TSA authorization before you can begin formal flight training. Flight schools that work with foreign students may be able to help you with the application process.

The initial eligibility requirements for the private pilot certificate are based on age and language ability.

According to 14 CFR 61, to be eligible for a private pilot certificate, a person must (1) be at least 17 years old and (2) be able to read, speak, write, and understand English.

These requirements apply at the time the certificate is awarded. For example, you don't have to be a certain age when you start, just when you finish.

There is no minimum age limit to fly an airplane as a student—as long as your feet and hands can reach the pedals and controls. The minimum age to fly solo is 16.

There is no maximum age limit to fly an airplane.

You must obtain the combined medical and student pilot certificate before your first solo. We address the medical certificate next.

Medical Certificate

Before you are allowed to fly solo as a student, you need to get a combined medical and student pilot certificate. Later, after you receive your private pilot certificate and the medical portion of your student pilot certificate expires, you need at least a third class medical certificate to attest to your fitness to be PIC.

The front side of the medical/student pilot certificate is a medical certificate, and it is signed by an Aviation Medical Examiner (AME). The back side is a student pilot certificate. It contains various CFI endorsements and is your license to fly while a student pilot. Note that you cannot carry passengers while you are a student pilot.

A medical/student pilot certificate is not required before you begin ground school or during the first part of flight training. It's a good idea to get it after you've taken a few lessons. Again, you must obtain the medical/student pilot certificate before your first solo.

The medical must be performed by an AME authorized to do so by the FAA. To find one, ask your flight school or search online. Don't assume your family physician has this authorization.

There are different classes of medical certificates, each with its own privileges and testing requirements. As a private pilot, you will most likely get the third class medical certificate. It's all explained in 14 CFR 61.

If you have a preexisting medical condition, such as high blood pressure that is controlled by medication, it doesn't mean you can't fly. However, it's essential that you disclose everything on the form and when consulting with the AME. Submitting false information to the FAA can be a felony.

If you have any concerns about how your current medical condition or history might play with the AME, fear not. AOPA offers an excellent Medical Certification Center service to members. You can call and talk in total confidence with someone who knows exactly how the process works. Check out AOPA's website for more information.

There are other pilot certificates that do not require a medical—just a current driver's license. These certificates have various restrictions, but they do let you continue to fly.

Allowing the use of a driver's license in place of a medical certificate is one of many steps the FAA is taking to make GA more accessible. Time will tell if this policy serves the common good. It's clear that for pilots who don't want to risk flunking an aviation medical, stepping down to a more restricted pilot certificate keeps them in the air.

Liability Insurance

Whether you rent, lease, or own an airplane, you absolutely, positively want to have your own liability insurance.

The question of insurance coverage is part of the conversation you should have when meeting with flight schools. You need to be absolutely clear on what's covered and what isn't, and who pays for what. Don't rely on a blanket statement from the school that "everything's covered." Ask to see a copy of the policy.

When you look through the policy, verify that the coverage is up to date. One of the symptoms of dying schools is they stop making insurance payments. And if they are unscrupulous enough to do that, they certainly won't tell you that their insurance has lapsed.

It is true that a flight school without current insurance won't stay open very long. A variety of interested parties gets notified when the insurance coverage on an airplane is dropped. But you don't want to fall through the cracks.

There are a number of renter and airplane owner insurance providers, including AOPA. Talk with aviation insurance agents before you sign up with a flight school. Tell them you will be asking them to review the flight school's policy to determine what kind of insurance you need and how much.

The flight school's own insurance agent should have the policy in a PDF file, which you can forward to your prospective insurance agency.

Legal Service Plans

If you lease an airplane, buy an airplane, have an accident, or get into trouble with the FAA, you are going to need an aviation attorney.

In your dealings with FAA, every word you say can and will be used against you. This is one of the dark sides of GA. You spend a lot of time, money, and effort getting your private pilot certificate. Yet you can lose it in an instant by making a bad maneuver.

You read horror stories about pilots whose initial contact with the FAA while under investigation is cordial, even supportive—only to find out later that the friendly investigator recommended pulling their certificates.

If you're a bad pilot, you shouldn't be allowed to fly. But you shouldn't have something very important taken away from you simply because of a regulatory glitch or an ambiguous bureaucratic process.

Likewise, if an accident's your fault, you should be held accountable. But there are many factors involved, and you want someone representing your interests and rights.

If you lease or buy an airplane, you will need a team of advisors: an A&P mechanic, a finance representative, a tax advisor, and an insurance agent. You also want an aviation attorney to review the agreements.

You can wait until you need an aviation attorney before you start looking for one. Or you can sign up for a legal services plan. One of the benefits of the AOPA plan is you get a free block of time every year.

Fortunately, I haven't had a run-in with the FAA. But I did lease an airplane once. I called the AOPA Legal Services office and had a very informative consultation with a knowledgeable aviation attorney, who was also a pilot. He reviewed the lease agreement prior to our conversation and was able to answer all of my questions.

What You Learn

In keeping with the mission of this book, I want to give you an idea of what you will encounter during your private pilot flight training. This section focuses on what you learn.

Aviation draws from a wide variety of disciplines: aerodynamics, navigation, radio communications, meteorology, engine mechanics, and many more. Most people who love flying enjoy this variety. But it is a challenge. You have to learn a lot about a lot of different subjects.

Beyond the formal training, there is practical knowledge that can only be gained through experience. For example, you're not going to find a chapter in a flight training book called "Checklists," "Fixed Base Operators," or "Airports." I address those kinds of topics because I want you to recognize them as an equally important part of the learning process.

Rather than try to discuss every topic that comes up in your training, I'm simply going to highlight a few key concepts and knowledge areas.

As explained in the Disclaimer section, I'm not authorized to provide instruction, and I am not an aviation authority. What follows is an illustrative overview, not flight training.

Checklists

It seems appropriate to start with the topic of checklists. That's because referring to a checklist is often the first part of any flight activity.

Already I can hear some experienced pilots murmuring in the background. "It's a checklist—not a 'do' list." That's right. The idea is that you perform a task, such as a preflight inspection of the airplane, and then refer to the checklist to make sure you haven't left anything out.

But there are times when you scan a checklist before you do something, like starting an engine, to make sure you don't leave out a critical step.

I also like to use checklists as study aids, and as part of my at-home preflight preparation. The typical checklist follows the entire sequence of a flight. As I read through the list, I visualize performing the task. It's a nice warm-up, and it's part of process I go through to get into an airplane-flying frame of mind.

Normally there's one comprehensive checklist, usually on a laminated card, that consists of many smaller checklists for each stage of flight. Following is an example of starting an engine (for illustration purposes only):

Throttle 1/4 INCH
Mixture RICH
Master Switch ON
Aux. Fuel Pump ON
Fuel Flow 3-5 GPH
Aux. Fuel Pump OFF
Mixture PULL
Propeller Area CLEAR
Ignition START
Mixture RICH
Oil Pressure CHECK
Power <900 RPM

You can create your own checklists. For example, make a checklist for what you do at home to prepare for a lesson. Another one I suggest is for your flight training. After you read this book, sit down and try to block out the key steps and requirements.

Checklists only help if you use them. Safety studies show that accident rates increase after a pilot reaches 100 hours of flight time. In other words, new pilots tend to be very careful. Then they get complacent.

Complacency can occur at any level of experience. When you read certain accident reports, you wonder how the pilot could have skipped the most basic steps. Most belly landings occur because pilots forget to lower the landing gear. These are pilots with thousands of hours.

The operative word is "forget." You use checklists so you don't have to rely on the reliably faulty human memory.

Regulations

The reality is that private pilots operate in a highly regulated environment. Gone are the days when you could fly with careless abandon. You need to know the regulations to be safe, and to protect your certificate.

Accept the fact now that learning key regulations will be part of your training process. Set aside about 20 percent of your bucket space to hold this information.

So what types of regulations will you encounter? To put things into context, let's look at the bureaucratic hierarchy of departments and agencies affecting your life as a pilot. Keep in mind this is a very high-level overview.

On the federal level, the U.S. Department of Transportation (DOT) oversees the Federal Aviation Administration (FAA). The National Transportation Safety Board (NTSB) is an independent U.S. government agency responsible for civil transportation accident investigation. The U.S. Department of Homeland Security (DHS) oversees the Transportation Security Administration (TSA) and U.S. Customs and Border Protection (CBP). For a full breakdown of the executive branch of federal government, see usa.gov.

Within the FAA's realm, the bulk of the aviation-related regulations are in Title 14 (Aeronautics and Space) of the Code of Federal Regulations. The key sections are in Parts 61 (Certification: Pilots, Flight Instructors, and Ground Instructors) and 91 (General Operating and Flight Rules). These regulations are referred to informally as the FARs (Federal Aviation Regulations) and can be found at faa.gov.

The FARs tell you what it takes to become a pilot and what you can do as a private pilot and airplane owner/operator. There are other regulations for commercial pilots and operators. You get to study those when you pursue your advanced certificates.

The FAA publishes the highly useful Aeronautical Information Manual (AIM). Although the AIM is not legally binding, parts of it restate and amplify some of the FARs. In addition, it contains helpful information on virtually every aspect of flight from the pilot's perspective. The AIM is available at faa.gov. It's also included in the combined FAR/AIM books offered by private publishers.

The NTSB gets involved when there are incidents and accidents (a distinction you will learn more about in your training). Those regulations can be found at ntsb.gov, along with the aviation accident database. For convenience, most FAR/AIM publications contain the chunk of NTSB regulations that apply to aviation.

Moving on to DHS, let's talk about the TSA.

As we discussed in the Initial Requirements section, TSA has rules regarding pilot training as part of its Alien Flight Student Program (see flightschoolcandidates.gov). TSA also puts out some GA guidelines, which you can read at tsa.gov.

As for CBP, the only time you'll encounter customs is when you fly across the border, in and out. In planning and filing that trip, you need to use the eAPIS system, which you can access through cbp.gov. Unless you want a military escort, make sure to follow the procedures very carefully.cbp.gov

Interesting aside: The AIM shows you how to handle a military intercept. That chart of wing-waggling instructions is something I've never been able to commit to memory.

That's it for now on the federal level.

State and local regulations come into play on a somewhat different level. The FAA regulates aviation. But your state decides how much to tax you for that new airplane. Your local municipality might own the airport and have some rules about noise abatement and landing fees. This information is not part of the flight training curriculum. You will learn it as you go along.

So there you have it. Regulations are like death and taxes. My advice is to not get upset or stressed out. You will find that every pilot has a system of bookmarking key regulations. I use an app on my iPad that does a marvelous job of this: Pro Pilot FAR/AIM by Aeronux Interactive.

Certain regulations you're expected to know, or at least know how to look up. It won't be fun, but you can boil it all down to a manageable list of memory items.

Stick and Rudder Skills

Stick and rudder is the wax-on, wax-off of aviation. Like the Karate Kid, you learn movements that become automatic in various stages of flight.

The book part of these skills is called aerodynamics. It's about different combinations of lift, weight, drag, and thrust.

The flying part is what your CFI teaches you up in the air. You learn about power settings and how to manipulate control surfaces such as ailerons, flaps, rudder, elevator, and trim.

The concepts of safety and performance are intertwined in this aspect of your flight training. You need to know how to make the airplane go where you want it to and when.

To teach and measure your ability to do so, the following standard set of practice maneuvers has been developed:

* Normal takeoff and landing

* Crosswind takeoff and landing

* Soft-field takeoff and landing

* Short-field takeoff and landing

* Straight and level flight

* Shallow, medium, and steep turns

* Climbs and descents

* Climbing and descending turns

* Rectangular course

* S-turns

* Turns about a point

* Maneuvering during slow flight

* Power-on and power-off stalls

* Forward slips

* Approach and traffic pattern

* Go-arounds

More than in any other aspect of flight training, stick and rudder skills require your mind and body to work together.

You can understand the physics of flight perfectly. But your brain has to tell your hands and feet how to work together in a highly coordinated fashion. You also learn how to sense the airplane's attitudes and movements.

Instruments

For every aspect of flight, there is an instrument or gauge to watch it.

Your first glimpse of the instrument panel of even the smallest airplane can be intimidating. And exciting. That dichotomy is one you will encounter often during your flight training.

When you first learn to fly, you become aware of instruments a few at a time. Then you start to develop a scanning technique as your eyes dart in an efficient pattern around the panel.

Most of your time will be spent looking outside. All pilots flying under VFR are required to "see and avoid" terrain and traffic. In the beginning, you fly the airplane by visual references (wings and nose relative to the horizon) and by sound (engine pitch and the rush of air). Instruments are a backup, and if they go out, you still have to fly the airplane.

As your flight training progresses, you learn how to "fly by the numbers." By using set control inputs and power settings, you can produce the desired airspeed, altitude, turn coordination, vertical speed, and so on. You measure this performance with instruments.

What you don't do is chase the instruments. Most of them measure what has already happened. You need to anticipate, not follow.

Toward the end of your flight training, you "go under the hood" and learn to fly entirely on instruments. This is what it's like flying in Instrument Meteorological Conditions (IMC).

In IMC, visibility is extremely limited. You encounter IMC on very cloudy or overcast days, and when bad weather or other atmospheric conditions obscure visibility. For example, severe winds can stir up dust and haze that limit visibility to a few hundred feet.

Who would fly in such conditions? Instrument-rated pilots on an Instrument Flight Rules (IFR) flight plan—and unlucky Visual Flight Rules (VFR) pilots who find themselves trapped by suddenly changing weather.

Going under the hood means to wear some kind of view-limiting device, which could be an actual hood or a set of fogged-up glasses called foggles. When properly hooded, all you can see is the instrument panel and controls.

Now you're in for a big surprise. Nothing ever sounded so simple yet is actually so hard to do.

Spoiler Alert A favorite CFI trick is to have you close your eyes and try to keep the airplane straight and level. Studies show you will get the airplane into an unusual attitude within seconds. The term "unusual attitude" is a euphemism for climbing into a stall, spiraling into a dive, or torquing in a nauseating way that will have you grabbing for the yuck bag.

What's really interesting is that the same thing can happen with non-instrument-rated pilots who are trying to fly with instruments in real IMC.

Without references to instruments, your senses will deceive you. You learn more about this phenomenon when you study the physiology of flight. For example, centrifugal force feels a lot like gravity. Having instruments helps, but only if you know how to use them—and rely on them rather than your senses.

The bit of instrument training you get while working on your private pilot certificate serves two purposes. It gives you some emergency preparedness for unexpected IMC. It also whets your appetite for the instrument rating, so you can fly IFR while the VFR pilots sit out the bad weather.

Navigation

My first small-airplane flight was in Indiana. As we departed the airport and flew over the featureless countryside, the thought dawned on me, "Where are we?"

A few minutes later I wondered, "How do we get back to the airport?"

Where are you now? Where are you going? How are you getting there? That's the essence of navigation.

Not to overstate the obvious, but an airplane is not a helicopter. It's always in motion and can only land—safely and legally—at an airport. From the air, airports are very hard to spot until you're relatively close to them.

Well use the GPS, you say. Indeed. New pilots depend on the "Direct To" button of the GPS like a baby on a bottle. But what if that bottle is taken away? What if the power goes out and all the navigation systems fail? As the old-timers like to say, now it's just needle and ball.

I think navigation is one of the most interesting aspects of aviation. When you spread out the charts, you feel a kinship with ancient mariners.

One of my favorite "aha" moments was learning how similar a VOR transmitter is to a lighthouse. The modern technologies of aviation evolved from tools and techniques navigators have used since they first started reckoning by the North Star.

So let's pull out a few buckets and start labeling them.

The first is pilotage. Don't laugh, but it means looking out the window and figuring out where you are. As you fly around, you should have an open aeronautical chart with you. Every few minutes you should be glancing at it to match up what you're seeing outside with what's on the chart. I use the word "should" because not every pilot does this.

Today I use pilotage all the time, even with the Garmin G1000 glass cockpit's moving map display as backup. Besides, it makes the trip a lot more fun.

Carrying current charts in the airplane is not specifically required. This is one of those gray areas. If an incident or accident occurs, and you don't have an aeronautical chart with you, it could be determined that you were generally unsafe and/or that you didn't adequately prepare for the trip.

Next up in sophistication is dead reckoning. Now there's a nautical term that evokes all kinds of images. It's based on the simple fact that time multiplied by speed equals distance. Start with a known location, pick a direction (heading), and voilà, you'll get to your destination with surprising accuracy.

Say all the navigation systems go down. We look out the window and see that we're flying over Gizzard Gulch. The chart shows the nearest airport, Last Hope, is 20 nautical miles due east. (Aviation uses nautical measures.)

Our airspeed is 110 knots or nautical miles (NM) per hour. Factor in a head wind of 10 knots, and that gives us a ground speed of 100 knots. Time multiplied by 100 NM/hour equals 20 NM. Solve for time by dividing 20 by 100, and you get 0.2 hours, or 12 minutes.

The one instrument that rarely fails—although it has a host of quirks—is the magnetic compass. Given the magnetic variation at our location, we subtract 10 degrees to convert chart heading to compass heading. For a chart heading of due east, that would be 90 degrees minus 10 degrees, which equals 80 degrees magnetic.

So we begin our turn, referencing the compass as we assume a new heading of 80 degrees. Then we check the time. Twelve minutes from now, we should be fairly close to the airport.

There is math in navigation. You can try doing it in your head. Or you can use one of many tools, both manual and electronic. The stalwart of manual calculators is the circular slide rule known as the E6B flight computer. Electronic versions of the E6B are also available in handheld devices or as apps.

Pilotage and dead reckoning were all the early pilots had. As the aviation industry evolved, a navigation infrastructure started to develop. At first, light beacons helped mark the way for airmail pilots.

Later radio transmitters were used as electronic navigation beacons. The early ones provided crude homing capabilities. They become more sophisticated with the use of Non-Directional Beacons (NDBs) and their associated cockpit instrument, the Automatic Direction Finder (ADF).

The great leap forward in radio navigation was the advent of the VOR transmitter. This is the electronic lighthouse. One signal sweeps like a continuous light around a 360-arc. A second signal flashes when that sweep passes north. Calculate the time difference, and you have a bearing to, or radial from, the station.

Your cockpit VOR receiver makes that calculation. Using an omni bearing selector (OBS), you can set a specific course. Well over a half-century old, ground-based VORs are still the primary technology used to navigate aviation routes—appropriately called victor airways.

In the modern era of aviation, systems developed that pinpoint your location anywhere on the chart. Called area navigation, you plot a direct course to a user-defined waypoint, without having to fly over VORs. These systems pull in signals from multiple sources. But they are still ground based (aka "terrestrial"). And some of them, such as Long Range Navigation (LORAN), are no longer used in aviation.

The next advance in navigation was to break free of our tether to the Earth, or at least part of the time. Inertial navigation systems use motion sensors, dead reckoning, and a computer to calculate your position. Before GPS, this

was a nice feature to have when flying over a big ocean. Even with GPS, the flight management systems of transoceanic airlines still rely on inertial navigation as a complementary navigation aid.

The newest navigation tool is GPS and its various enhancements. This space-based satellite system provides location information wherever there is an unobstructed line of sight to four or more GPS satellites.

In the beginning, GPS was a proprietary military system. Then civilian use was permitted, but with restrictions that prevented pinpoint accuracy. That was fine if you were hiking, but aviation demanded more. As the restrictions were lifted and systems improved, the FAA accepted GPS as a cockpit navigation aid—after adding a few restrictions of its own.

The flight systems that come with GPS can make all those dead reckoning calculations we talked about earlier. They can display your exact ground speed, miles to destination, arrival time, and more. Plus you can create and save flight plans with user-defined waypoints. Push a button to load the flight plan, and then let the autopilot take over. We'll talk more about autopilots later.

Weather

There are two aspects to the weather training you will receive. One is learning basic meteorology—the different types of weather and what causes them. The other is identifying the approved sources of aviation weather information and learning how to interpret textual reports and charts.

Authorized sources of aviation weather include the federal government and approved commercial weather information providers. The two big players in government weather are the FAA and the National Weather Service (NWS).

When you do your preflight planning, you will consult these sources and their various types of weather reports. With that information, you will piece together a picture of weather conditions at your point of departure, along the intended route, and at your destination.

When we say the weather picture, it goes beyond "sunny skies and warm temperatures." You're interested in wind direction and speed, temperature and dew point, altimeter setting, cloud types, ceilings, visibility, various forms of precipitation, and more.

Let me warn you right now, deciphering old-style aviation weather reports can be tedious. This arcane terminology harkens back to the days of limited bandwidth, when every character took up precious space.

Here's an example of what's called a METAR report:

KPSP 291453Z 34008KT 10SM CLR 09/M14 A3025 RMK AO2 SLP246 T00891144 53006.

This is what it means:

Conditions at: KPSP (Palm Springs, CA) observed 1453 UTC 29 January 2012
Winds: from the NNW (340 degrees) at 9 MPH (8 knots; 4.2 m/s)
Visibility: 10 or more miles (16+ km)
Clouds: sky clear below 12,000 feet AGL
Ceiling: at least 12,000 feet AGL
Temperature: 8.9°C (48°F)/Dew point: -14.4°C (6°F) RH = 18%
Pressure (altimeter): 30.25 inches Hg (1024.5 mb) Sea-level pressure: 1024.6 mb
Weather: no significant weather observed at this time

METAR stands for Aviation Routine Weather Report.

Huh?

As you might suspect, the French are responsible for this confusion. A while back the world got together to standardize "aerodrome" weather terminology. French was the language they used. Hence, METAR stands for *message d'observation météorologique pour l'aviation régulière*. Sacrebleu!

The old black-and-white weather charts aren't much easier to decipher, sometimes resembling a meteorological Rorschach test.

Fortunately, online aviation weather reporting has added color and motion, as well as clear English descriptions. In addition, weather information aggregating tools make it easier to get the essentials quickly. An example of such a tool can be found on the AOPA website.

As for dealing with the actual weather, you need to understand how certain phenomena affect weather and your attempts to fly through it. Topics include high- and low-pressure systems, winds aloft, turbulence, freezing levels, thunderstorm activity, windshear, smoke, haze, snow, hail, mist, rain, fog, dust, and my personal favorite, volcanic ash.

Do you know the difference between ground fog, advection fog, upslope fog, and steam fog? You will learn about these types of fog and the weather conditions that lead to their formation.

There is one weather subject I do enjoy, and that's the great variety of cloud formations. Altocumulus. Nimbostratus. Cirriform. Now whenever I see clouds I try to name them.

You will not be trained or rated to fly in the clouds. Your job while flying VFR is to avoid them. If you get stuck in clouds or other IMC, you're going to have a serious problem.

Seems like a simple proposition to look at a weather map and decide where you can safely go. But weather has a habit of changing.

You will be making go/no-go decisions and selecting alternate airports while still on the ground, and getting updated weather reports from the air. To make flight and destination choices, you also have to take account of weather-related regulations.

Weather rules are about things like visibility, distance from clouds, flight into known icing conditions, and minimum takeoff and landing requirements. The visibility rules kick into high gear when you become an instrument-rated pilot and you're shooting an approach to an airport.

Bottom line on weather: Not respecting it causes a lot of accidents every year.

Radio Communications

Before you read any further, go to liveatc.net, search for KLAX, and listen to some radio calls for a few minutes. I'll wait here until you're finished.

. . .

What you were listening to was tower traffic at Los Angeles International Airport (KLAX). Fortunately, the airspace you'll fly in is less congested. The pace of radio traffic will be slower. But it will sound much the same.

In the beginning, I was really intimidated by aviation radios. It's not as if you don't have enough on your hands flying the airplane. Now you've got to listen to radio traffic for situational awareness, recognize when ATC is using your call sign, and talk pilot-speak without sounding like a neophyte, which you are.

To add to the stress, you're on the same frequency as the airline captains and other professional pilots—who hear every one of your hesitant attempts at communication.

Don't feel bad. Every new pilot goes through this phase. You have to use the radios to learn them. You will suffer inevitable embarrassment.

Let's break down what makes using radios challenging:

* You have to fly the airplane while using the radio at the same time.

* There is usually more than one Communications (COM) radio.

* The COM radios, along with navigation receivers, are controlled through a complex panel.

* You must state succinctly who you are, where you are, where you're going, and what you want—using standard phraseology.

* You always have to monitor the background chatter to know what's going on around you. If you hear your call sign, that's ATC giving you a shout out, to which you must respond.

* As you fly along, ATC assigns new frequencies when handing you off to new controllers. You've got to dial those in, as well as change navigation frequencies.

These are the technical challenges. There are also human challenges—or shall I say controller challenges. We look at those in the next section, Air Traffic Control.

What can you do now, before your formal training begins? Listen to liveatc.net on occasion. Don't try to figure out the radio calls. Let the exchanges flow and allow the familiarity to build naturally.

Once you start your training, here are some suggestions that might help you learn radios easier and faster:

* Create a script of standard radio calls. Your flight school might already have one for your area. If not, look online for a generic script you can localize. The idea is to identify the nature and sequence of call elements—not to memorize specific verbiage.

* Listen to traffic in your area if your airport or one nearby is listed on liveatc.net.

* Buy an aviation radio and hang out at your local airport FBO to listen to radio calls. Or borrow one from the flight school.

Once your flight training is in full gear, I highly recommend listening to radios whenever you can.

Air Traffic Control

When you are in the air, you are only a radio call away from someone who can help you.

The people who provide Air Traffic Control (ATC) are referred to as "controllers." There are various types of controllers, depending on your location and phase of flight. They include approach control, the airport tower, ground control, center (aka Air Route Traffic Control Center or ARTCC), clearance delivery, and departure control. What they all have in common is managing air and ground traffic for safety and efficiency.

I have the highest regard for controllers. I once took a tour of a Terminal Radar Approach Control (TRACON) facility. I recommend doing this when you have a chance. The FAA Air Safety program sets up these tours.

In the previous section, we talked about getting up to speed on radios. Once you get past the technical part, the real challenge is learning how to communicate effectively with ATC. There are protocols. There are expectations and responsibilities for pilots and controllers alike. The Aeronautical Information Manual (AIM) has a section on proper radio communications, as well as a pilot-controller glossary.

Air traffic controllers are regular people. They have personalities. They have good days and bad days. Above all, they are highly trained professionals. Ninety-nine percent of the time they will do everything possible to help you out. One percent of the time they will kick your butt.

It's almost a rite of passage to get chewed out by a controller.

Early in my training I made a call announcing I was inbound to an airport. I left out the name of the airport. Given the context of the call, it was obvious where I was landing. Most controllers would have brushed it off, or simply confirmed my destination. But, procedurally, the call was not precisely correct.

That day I got a controller who decided to give me a dressing down—on the air, with American, and United, and everybody else listening in. "Exactly which airport do you want to land at, Cessna 12345? We have three airports in this area. How am I supposed to know which airport?" And so it went for what seemed like an eternity. It didn't help that I immediately apologized and corrected the call. He kept banging away at me.

My radio calls got a lot more precise after that.

The only other time I've heard a controller really go off was when some pilot was flying at night and heading directly for a mountain. "Cessna 54321, turn left immediately. Turn left immediately." Just so you know, "immediately" is a very strong word in controller language.

What followed was a relentless tirade. "Do you know where you are? Are you tracking a radial? You've been wandering all over the damn place. Do you have any idea what you're doing?"

Considering the pressures controllers are under, these occasional eruptions are understandable.

What you never want to hear is, "Cessna 13579, copy down this phone number." Oops. Now you've done something really bad, and an air traffic control supervisor wants to talk with you when you land. If you're lucky, you'll get a good chewing out. If not, that conversation could be the first step in a formal FAA investigation and enforcement action.

Fortunately, I've never had this experience. But I have heard ATC give out phone numbers more than once.

To improve your ATC skills, check out the relevant sections of the AIM. Additionally, look for articles about effective ATC communications. You will find them all over the web. AOPA has a nice selection of articles as well.

Airplane Systems and Equipment

Have you ever read the owner's manual that comes with your car? You don't have to know much about how a car works to get a driver's license. If your car breaks down, you can pull over to the side of the road and call for help.

The expectations for flying an airplane are bit higher.

Many airplanes have a "generic" Information Manual (IM) for the make and model. There is also a customized Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM) approved by the FAA for that particular airplane. (In this book I will just refer to the POH.) Your flight school usually has extra copies of the IM. I recommend asking for one early in your training. You can and should read it cover to cover—but take small bites so you can digest the material comfortably.

You are expected to know your airplane's various systems, including antenna, autopilot, control, electrical, fuel management, gyroscopic, hydraulic, mechanical, pitot-static, navigation, radio, and vacuum systems.

The same goes for the engine—its type, size, enhancements, and other operating information. For example, a Cessna 172 might have a Textron Lycoming IO-360L2A, which means it's a 360-cubic-inch, fuel-injected, reciprocating engine with horizontally opposed pistons. During your oral exam, the DPE might ask what the "IO" stands for.

If you're flying an airplane with the advanced avionics of the glass cockpit, such as a Garmin G1000, there are additional systems beyond the basic ones you find in a conventional small airplane. For example, the Attitude and Heading Reference System (AHRS) uses electronic sensors in place of gyroscopic and vacuum systems.

Your airplane is required to have certain equipment installed depending on whether you're flying day or night VFR, or IFR. There may be additional required equipment specifically for your airplane. Not every instrument has to be working to fly legally, but there are rules on how to handle inoperative instruments. For more information, see 14 CFR 91.

Airplane system information is presented in a general way in the IM. The specific configuration of your airplane is detailed in the POH. The FAA requires you to have the POH in the airplane at all times during flight.

You're not expected to have the knowledge of an Airframe and Powerplant (A&P) mechanic. But you will learn what a magneto is and where the fuel drains are located on your airplane.

Airplane Performance

Part of your ground training is learning what kind of performance you can expect from your airplane in various conditions of flight.

You will find most of the information you need in your airplane's IM and POH. They are also good sources for checklists, normal operating procedures, and emergency procedures.

By request of the FAA, aircraft manufacturers have standardized the categories and content of the IM and POH. They are:

* General

* Operating Limitations

* Emergency Procedures

* Normal Procedures

* Performance

* Weight and Balance/Equipment List

* Airplane and Systems Description

* Airplane Handling, Service, and Maintenance

* Supplements

Under the category of Operating Limitations, you need to know the different airspeeds associated with your airplane. When will it stall (wings lose lift), flaps in or flaps out? What is the rotation speed (when you pull back on the control wheel during takeoff)? Best rate and best angle of climb speed? Glide speed (when the engine goes out)? Maximum safe operating speed? Never-exceed speed?

Here's a sample list of these "V" speeds, in knots, for a Cessna 172: **Vs0** 40, **Vs1** 48, **Vr** 55, **Vx** 62, **Vg** 68, **Vy** 74, **Vfe** 85, **Va** 105, **Vno** 129, **Vne** 163.

You learn your airplane's takeoff and landing performance characteristics. They tells you how much room you need on the runway—especially if you have to clear an obstacle near the end of the runway.

You use climb, cruise, and descent information at various engine power settings to calculate endurance for time and fuel.

How high an airplane can go is its ceiling. This altitude might be higher than you can go without supplemental oxygen.

Weight and balance calculations tell you how to load the airplane for maximum safety and fuel efficiency.

It's important to make adjustments for environmental factors. Smaller airplanes can't make a safe landing if the crosswind is too high. Air temperature and pressure can affect engine performance and the lift of the airplane wing.

For example, density altitude is a critical factor when you're taking off heavy from a high-altitude airport on a hot day. The performance degradation is stunning.

You also find operating limitations in placards (small signs) posted around the instrument panel, as well as in markings on some of the instruments themselves.

All of the operating limitation and performance numbers are based on an experienced test pilot flying a new airplane in standard temperature and pressure conditions. You need to determine the numbers for the airplane you're flying in the real world.

Airplane Inspection and Maintenance

As a student pilot, you are not trained to inspect or maintain an airplane. But you do learn about required inspections and maintenance.

The FAA strictly regulates airplane inspection and maintenance. There are rules about:

* What must be inspected, when, and by whom.

* Who may perform various kinds of maintenance.

* How an airplane that has received maintenance may be returned to service.

* When, how, and by whom airplane logbooks entries must be made.

Most airplane maintenance must be performed by an A&P mechanic or in a supervised maintenance shop. Some simple types of maintenance can be performed by an airplane's owner or operator.

For more information about airplane maintenance and inspections, see 14 CFR parts 43 and 91.

As a student pilot, you learn simple maintenance tasks like how to check and add oil, and how to check and add fuel. It's a training milestone when you fuel up the airplane by yourself at a self-serve. (Don't forget to attach the static cable.)

Maintenance comes into play as well when you do the preflight walkaround. If you find a problem, there's a good chance maintenance will be required to fix it.

If you rent an airplane, it's not your job to take care of it. But when you become PIC, you are responsible for knowing that all necessary inspection and maintenance has been performed within the required timeframes.

So start a good habit now. Keep a maintenance and inspection recap for every airplane you fly, whether it's yours or a rental. When's the next annual due? The 100 hour? Pitot-static check? Oil change? Time before overhaul (TBO)?

A good school will have this information posted prominently on a whiteboard. Follow it to see if entries change as various dates pass.

Finally, there are certain specs your need to learn about your airplane.

How many quarts of oil does it hold? What grade? How often should it be changed? How many gallons will it hold? What type of fuel?

You will find most of the information you need in your airplane's IM and POH.

Physiology of Flight

We humans are ground dwellers. It's not natural for us to be up the air, much less moving at fast speeds. Add obscure weather, high altitudes, nighttime conditions, or unusual attitudes, and our sensory systems can become unreliable.

You will learn how your body reacts to various conditions of flight. You need to have this knowledge so you can avoid potential problems and handle them properly if they do occur.

When you study stick and rudder skills, you also learn how your body senses the airplane's movements using sight (visual), skin pressure (kinesthetic), and inner ear (motion) changes.

When you start working with instruments, you see firsthand how the senses can be tricked without outside references. Centrifugal force can feel like gravity. Accelerating feels like climbing. Slowing down feels like descending. In a level turn, you may think you are flying straight. If you move your head suddenly, you can experience vertigo.

When you study weather, you learn how clear air makes everything seem closer. Haze or rain makes things seem farther away.

Optical illusions are their own topic. How high you are or how a runway is sloped can affect its apparent size. In obscure weather or at night, a highway or string of lights can be mistaken for the horizon. Darkness looks empty, but it could be covering a body of water or hiding a mountain. A part of your flight training is devoted to flying at night.

When you study hyperventilation and hypoxia, you learn how the body reacts to changes in carbon dioxide and oxygen. There are regulations to protect you and your passengers from the adverse effects of oxygen deprivation.

Above a certain cabin pressure altitude and after a certain amount of time, the flight crew (you, the pilot) must use supplemental oxygen. At an even higher altitude, it must be offered to your passengers. The exact requirements can be found in 14 CFR 91.

The safety of cabin air can be affected by the possible leakage of undetectable carbon monoxide from a faulty exhaust or heating system. Many GA planes now carry carbon monoxide detectors.

I've only touched on a few physiology-related topics in this section. Your flight training will go into much more detail.

All this book knowledge becomes real when you're up in the air, alone. Flying solo over a mountain range at 11,500 feet, you realize the airplane is a machine being operated by a very vulnerable human body.

You have to be smarter than your body and anticipate problems before anything goes wrong.

Airports

An airport can be something as simple as a dirt strip with a hangar and fueling station. It can have one runway or many going in different directions. Check out the Santa Fe New Mexico airport (KSAF)—it looks like an asterisk with crisscrossing runways.

Runways can be as short as a few thousand feet or more than three miles long.

An airport can have a control tower, or not. It can be used for commercial passenger transportation, or GA, or both.

There are airports everywhere. You already know about the big ones. But when you open up an aeronautical chart for the first time, you'll be surprised how many small airports are scattered around.

The official directory of airports is the FAA's Airport/Facility Directory (A/FD). Published by region, it's a little green book. The same information is provided through faa.gov and numerous other online sources.

I especially like the AOPA airport directory. It combines airport and live weather information. Plus it has airport runway diagrams, kneeboard printouts, and even satellite pictures—which are especially helpful if you've never flown to that particular airport. Similar information is available in iPad apps, such as ForeFlight.

You learn a lot of different things about airports. How to:

* Take off and land.

* Approach an airport.

* Fly around and over and airport.

* Fly a pattern.

* Communicate with other pilots if there is no tower.

In larger, towered airports, you learn how to communicate with various air traffic controllers.

That's the technical stuff. There is also an airport ecosystem made up of fueling stations, FBOs, pilot lounges, aviation mechanics, flight schools, transient parking, hangars, ground crew, airshows, and more. You will learn the rules, written and unwritten, for your home airport and the airports you fly into frequently.

It can be intimidating when you land at an unfamiliar airport.

The crosshatch of taxiways is easier to decipher from the air. Kneeboard diagrams help, but on the ground, everything looks flat. Signage directs you. You can also ask for progressive taxi instructions.

Where are you supposed to park? Or more correctly stated, tie down? Various places are available in front of FBOs, restaurants, maintenance shops, and flight schools.

When you get to the desired spot, maneuvering the airplane through and around the other airplanes can be daunting. Everywhere is a clutter of wings. It is then you realize that even the slightest scrape can cost thousands of dollars to repair. Whose policy covers that?

Perhaps someone on the ground crew is giving you hand direction signals. Without that assistance, you've got to figure out on our own if your airplane will fit into an open slot. Getting into position requires some fancy footwork and power control.

Some instructors are masters at fitting into the tightest spaces. They relish the challenge. They know instinctively where the wingtips are and come within inches on either side. They tell me it's about watching shadows on the ground.

When I'm parking by myself and trying to get into a tight spot, I get as close as I can and shut down. Then I get out and pull the airplane into position, one inch at a time.

When you're going to a new airport, you don't have to operate in ignorance. If you have questions after consulting the A/FD, call someone. Call the airport office. Call the FBO. Call the flight school. Heck, call the restaurant on the ramp if all else fails. Tell them it's your first time into the airport and that you have a few questions.

Most people will be happy to help you out. You'll definitely get some of information that will make you glad you called ahead.

Flight Planning

Navigation + Weather + Destination = Flight Planning.

There are times, especially during the early parts of your training, when you take off and fly around without a specific destination. If you're flight training, you definitely should have a plan for what you're going to do while up in the air. But you don't need to have a detailed flight plan.

To be clear, every single time you fly in an airplane you do a certain amount of flight planning. You always check the weather and the NOTAMS. You review the charts to make sure you're familiar with the terrain and alternate landing sites. You look up your destination and possible alternate airports in the A/FD or an online source. But all of this can be done in a few minutes.

Now let's suppose you want to make a longer, cross-country trip, a flight that will take more than an hour and cover more than 100 nautical miles. Although you might be able to wing it with your GPS, as a prudent pilot you will prepare a flight plan.

As a student, you learn to do flight planning the traditional way. You spread out the charts, pull out your plotter and E6B flight computer, and start drawing lines with a pencil.

You plan a route that links navigational aids, airports, and easily identifiable landmarks. You can also draw a straight line, assuming you can fly high enough to clear obstacles and terrain. My preference is the former—if

something goes wrong I like to be near an airport or in proximity to known reference points. Your first charting efforts will be with your CFI at your side.

After you've drawn your route, you measure each segment and plot the headings. You then make adjustments for magnetic variation. The north that your compass points to is actually somewhere in Canada—and is moving toward Russia at almost 40 miles per year. Since the chart is based on true north, you have to add or subtract a few degrees from chart headings to get the magnetic headings you'll actually fly.

Next you check the weather. Assuming conditions are favorable along the route and at your destination, you turn your focus to the wind. Actually, the winds aloft.

How soon you get from here to there depends on how fast you're traveling over the ground, aka ground speed. A hefty tailwind gets you there faster, a headwind slows you down. So you make wind adjustments to your planned airspeed, and then calculate ground speed and fuel consumption.

You get the airspeed and other performance numbers from your airplane's POH. It tells you things like how much time it takes the airplane to climb to a certain altitude, and how much fuel it will consume doing so. It also tells you the endurance limits of the airplane based on mileage, time, and fuel capacity.

As part of your flight plan, you decide whether to get there faster and consume more fuel, or go slower and consume less fuel.

Weight is a factor in how much fuel you can carry. Your Cessna 172 may have four seats in it, but that doesn't mean you can take off with full tanks and four 200-pound bodies, plus baggage. Maybe you can in a turbocharged Cessna 182 with 235 hp, but not the 172 with its less powerful engine. So you also have to do a weight and balance calculation.

There are no specified requirements for a pilot operating under 14 CFR 91 to conduct weight and balance calculations prior to each flight. But why wouldn't you? You definitely need to when drawing up a flight plan, because the amount of fuel you will carry is central to a number of calculations.

In the beginning, as with charting, you will do your first weight and balance analysis by hand. Your flight school should have a form with information about your airplane already filled in. Using arms and moments, you calculate the loaded airplane's center of gravity, and then check the POH to make sure it falls within acceptable limits.

I'm not going to explain center of gravity, arms, and moments. Label a bucket "weight and balance" and set it aside.

After you have charted your course and made all your calculations, the last step is to fill out a flight plan form. This, along with the charts, is what you will carry with you in the cockpit. It shows each leg of the trip and the associated distance, time, and fuel consumption. Add up the legs and you have the totals for the trip.

Starting with your departure time, you can now estimate your time en route and estimated time of arrival for each leg, and for the trip as a whole.

Flight plans are for your use as a reference before and during flight. There are times when the FAA would also like to have a copy of your flight plan. In those instances, you "file" your flight plan with a specialist at an FSS, or through an automated service.

VFR flight plans are voluntary, unless you're crossing the border. The FAA encourages you to file them to assist search and rescue teams. If you don't close your flight plan within 30 minutes after arriving at your destination, they start looking for you. Filing IFR flight plans is mandatory.

This flight planning process is the same one you'll follow when preparing for your private pilot practical test with the DPE. The DPE will give you a destination, and then expect you to discuss your flight plan during the oral exam part of the practical. The DPE will want to know why you made the choices you did, and how current weather conditions and other factors affect the trip.

The flight portion, or checkride, may start off with you flying the first parts of the plan. We discuss the practical test in more detail later.

Once you've mastered the art of traditional flight planning, your CFI will introduce you to the plethora of apps and online flight planning tools available. Many of these are free. The one on the AOPA website that comes with your membership is excellent.

For a quick set of numbers and integrated weather, I like the government-sponsored Direct User Access Terminal Service (DUATS).

Most of the electronic services let you file your VFR or IFR flight plans directly by phone, computer, iPad, or other device.

Not to confuse things, but there's also a flight planning feature in an airplane's GPS and Flight Management System (FMS). This feature does not create a formal flight plan that can be filed electronically. Rather, it simply allows you to select a set of waypoints along your intended route of flight and program them as one named flight plan in the GPS or FMS.

These programmed flight plans make flying a lot easier. The GPS or FMS sequences through each waypoint, giving you a heading to fly and all the related time, distance, speed, and other information. This is a great crosscheck for your ground-prepared flight plan.

What's really cool is to switch on the autopilot and watch the plan fly the airplane—and do so more precisely than you ever could. We'll talk about autopilots next.

Autopilots

If the airplane you're training in has an autopilot, odds are you won't get introduced to it until the end. After all, you're still learning stick and rudder skills.

A single-axis autopilot controls an aircraft in the roll axis (wings side to side). It is sometimes called a "wing leveler." You can use it to maintain level flight and follow a heading. This type of autopilot can usually couple with navigation sources like a VOR or GPS and even follow IFR approaches loaded in a database.

A two-axis autopilot controls an aircraft in the pitch axis (nose up and down) as well as roll axis. It can do everything the single-axis autopilot does, plus it controls altitude. All that leaves for the pilot to control is yaw (nose side to side) with the rudder pedals, which is necessary to maintain coordinated flight. And, very importantly, the throttle.

When you get your private pilot certificate and start doing some serious flying, the autopilot will be a helpful tool. Hand flying gets physically tiresome, although with improved aerodynamics and trim controls, it is easier than in the old days.

Things can get really busy on a complicated flight. Under the concept of Single Pilot Resource Management (SRM), you want to use your time and energy to manage the cockpit and the airplane as efficiently as possible.

Never forget: Even with the assistance of an autopilot, you are still flying the airplane. Using it does not excuse complacency. Moreover, autopilots can add their own level of technical complexity. If you're not careful, you can lose speed while climbing and inch imperceptibly into a stall. That's where throttle control comes in.

Autopilots have also been known to go haywire and fly the airplane into unusual attitudes. Part of your training is learning how to test the autopilot on the ground, as well as the various ways of wresting control from the autopilot and disengaging it in the air.

Emergency Procedures

One fine day I was slipping the surly bonds of Earth. Ah the joys of flight, I thought to myself. Then, without warning, my CFI reached over and pulled the power.

"Looks like we have an engine-out situation," he said.

"What do we do?" I asked, trying to hide the panic in my voice.

"Well, I don't know about you, but I'd be looking for a place to land."

Now you've got an emergency on your hands. The first thing you do is recite your ABCs:

A: Airspeed to best glide rate. B: Best place to land. C: Checklist.

Acronyms help you remember what to do. In a spin, PARE. P: Power pull. A: Ailerons level. R: Rudder opposite spin. E: Elevator briskly forward (as needed). The four Cs of a go-around: Cram, Climb, Clean, and Communicate.

Your crafty CFI is always full of surprises. "Oops, this just happened. Now what?"

You study emergency scenarios on the ground, and then practice them in the air. You carry emergency checklists. The first steps are memory items, and the remaining are the "C" checklist items.

After you've been flying a while, I recommend reading NTSB accident reports. You can see the kinds of problems that develop and how pilots respond. Also helpful are the many articles pilots have written, usually with titles like "How I survived...."

You can supplement your formal training with safety and emergency procedure information found on the FAA and AOPA websites.

Anticipating the most common emergency situations, and preparing for them, is the best way to overcome fear of flying. We'll talk more about fear in a later section.

Preparing for Flight Training

If you're like me, you like to be prepared going into a new situation. I encourage that attitude regarding your flight training. Most of that preparation is about becoming familiar with the process rather than trying to learn a lot of specific information ahead of time. In my humble opinion, reading this book is a good start.

If you are really eager, there are some additional things you can do.

For other books to read, I'd suggest two publications from the FAA. The first one is "Student Pilot Guide." The other is "Airplane Flying Handbook." Both are available for free at faa.gov.

I would not try reading the combined FAR/AIM. You don't have enough context to sort through this weighty material. Do get a copy for looking up regulations.

I would join AOPA and poke around its website. Get a subscription to "Flight Training" magazine. It comes with your membership. But avoid the temptation to do a deep dive right now. Information learned out of context is not only useless, it's potentially misleading. You don't want to waste brainpower later on having to reconnect the dots correctly.

As for video, check out "The Aviators," which airs on many PBS stations. It's available from numerous online sources, such as iTunes. From the show's blurb:

"We will take you behind the scenes to show you how airline pilots train, how planes are built, and how ATC works. We will profile aviation businesses and showcase aviation products. We will provide safety tips for private and recreational pilots and career tips for professional pilots."

It's a good program, but it does have some Canadian content. Keep in mind that Canada's aviation system is similar but not identical to the one we have in the United States.

I almost hesitate to mention this—but I know you're already watching "Flying Wild Alaska" on the Discovery Channel. I love that program so much I actually thought about becoming a bush pilot. Briefly. That delusion went the way of my cargo, corporate, and airline pilot dreams, which is the subject of another book.

But let's get serious. This is extreme flying under special rules that frequently get stretched beyond credibility. Moreover, the narrator has a bad habit of misstating regulations. What's good about the program is that it takes you right into the cockpit on real flights. Just don't rely on it as an authoritative source.

I'm also ambivalent about using Microsoft's Flight Simulator X (FSX) and other computer flight simulators at this stage. Each of us has a limited amount of mental bandwidth. It takes a lot of time to learn how to properly configure and use FSX. That knowledge has nothing to do with flying a real airplane.

In a similar vein, there are full-fledged simulators with realistic control panels entering the home market. Some of them are approved by the FAA as Basic Aviation Training Devices (BATDs). We talk more about BATDs and other Flight Training Devices (FTDs) later.

The most useful thing you can do is start thinking like a pilot. Here are some simple warm-up exercises:

* **Your car:** Try driving more precisely. Hold the same speed. Glance at your "instrument panel" briefly but regularly. Learn how to stay ahead of the needle rather than chase it. Keep the car in the center of the lane. Scan the traffic around you. Build your situational awareness by knowing what's going on at all times.

* **Compass:** Get a compass for your car and always maintain a sense of your direction. Practice expressing direction in degrees. For example, due west is 270 degrees. If you're really ambitious, practice computing the inverse (90 degrees for 270). You make that conversion every time you pick which runway to use.

* **Wind:** Learn to look for natural indications of wind direction—swaying tree branches, blowing clouds of dust or smoke, undulating waves on water. Wind is defined by the direction it comes from. A westerly wind blows from west to east.

* **Weather:** Put a shortcut to the Weather Channel on your desktop and check it every day. Look at the expanded detail view and note wind speed and direction, pressure, dew point, and visibility. Scroll down and study the map. Get a sense of how the weather is changing, and why.

* **Liveatc.net:** Find an airport on this site that is near to where you'll be training. Start listening to radio calls. Don't try to understand everything. Just get used to the sound and rhythm. Leave it on while you do other things. When you fly, you hear this continuously as background in your headset.

* **Hang out:** Somewhere near you is a GA airport. Go there and hang out at the local FBO. Observe the movement of people and airplanes. If you can get an aviation radio, listen to the radio calls as airplanes take off and land as well as enter and leave the pattern.

Flight Training Process

At this point, you've got an idea of what you learn in private pilot flight training. Now we're going to look at how you are trained.

Ground School

I don't know anyone who's ever taken a full-fledged ground school course.

There is an FAA certificate for ground instructors. You find them working for the airlines and specialty training providers, such as FlightSafety. Many ground instructors are not pilots. A number of them have an education background. Some have military training.

Most of what's called "ground school" for private pilot flight training occurs informally and on a self-study basis.

The FAA mandates that you acquire a certain amount of aeronautical knowledge. Your CFI has to certify that you have done so before you can take the private pilot knowledge test (aka the written exam).

How you acquire this knowledge is not defined, at least in a 14 CFR 61 setting. If you train at a part 141 school, more structure is required. But you won't get that kind of training unless you go to a flight academy or a university with an aviation program.

So what do you do as a private pilot student? You can read books assigned by your CFI, say from the library of free government-published books at faa.gov. Or you can take a self-paced online course that includes informational content, flight demonstration videos, and testing modules.

For example, if you train at a Cessna-certified flight school, you'll probably use the King School's private pilot course. This material started as audiotapes, and then evolved into videotapes, CDs, and DVDs. Now a web-based version is available.

Another type of ground school also occurs when you and your CFI are chatting in the hangar before and after a flight. Ideally, your CFI should brief you on what will be covered in the lesson before you take off. Then after you land, it's good to debrief—i.e., discuss what you covered and what went right or didn't.

I believe in paying for the CFI's ground school time. That way you won't feel guilty about asking all the questions you want.

Dual Instruction

Training airplanes have two sets of controls, as do many other types of airplanes. Typically you, the student, sit in the left seat, and your instructor sits in the right seat. You each have your own control wheel (or yoke) and set of foot pedals. However, you both share one instrument panel.

In the beginning, your instructor will do most of the flying. As time goes on, you will gradually become the "sole manipulator" of the controls. As the term implies, you're flying the airplane.

But you are not PIC. That is a legal distinction based on who has final authority over the fight. Until you take your checkride and get your private pilot certificate, you are a student and your instructor is PIC. The one exception is the limited endorsement you receive to fly solo as a student pilot.

If you have a good CFI, he or she will let you do as much on your own as possible—even if it involves making some mistakes—and intervene only when absolutely necessary.

The proper amount of CFI manipulation of the controls can be tough to sort out. Even under ideal circumstances, a good CFI will make a nudge or a tweak. In the beginning, all CFIs will have their hands and feet strategically positioned over the controls, especially while you land. If you have a not-so-good CFI, he or she will grab the controls from you frequently, or at least strong-arm them during critical flight maneuvers.

It is during the dual instruction phase of your flight training that you learn basic stick and rudder skills. As we discussed in the Stick and Rudder section, there's a lot of wax-on, wax-off. Or perhaps a better analogy is practicing ballet in the sky.

Like a dancer learning to balance, your first goal is to keep the wings level. Then you move on to climbs, turns, and descents. As you progress, the maneuvers become more challenging. Eventually you work your way through the set of maneuvers that make up the Practical Test Standards (PTS). This is the repertoire you must perform for the Designated Pilot Examiner (DPE).

Once you've learned the basics of flight, you and your CFI will go flying. You will fly to smaller and then bigger airports. You will fly at night. You will take a cross-country flight—the same one you will fly by yourself.

The last part of your dual instruction will be devoted to preparing you for the flight part of the private pilot practical test (aka checkride).

But that is not the end of your experience with dual instruction. The only difference is that you will log your time as PIC. Whether for advanced training, a flight review, or brushing up, a CFI will be sitting in that right seat again sometime.

Flight Training Devices

Devices that simulate flight have been around several years. They vary by size, realism, and cost, as well as on how time training in them can be applied toward certificate and rating requirements.

The nomenclature gets a bit confusing. The FAA distinguishes between Flight Simulators (SIMs) and Flight Training Devices (FTDs).

Generally speaking, SIMs have the highest degree of realism by using motion and full-scale flight decks. If you end up working as an airline or other kind of professional pilot, you'll train on these highly advanced machines at places like FlightSafety.

FTDs are less realistic than SIMs, although in recent years their sophistication has increased while prices have come down.

There used to be a further distinction between FTDs and Personal Computer Aviation Training Devices (PCATDs). Those two categories have been subsumed under the term Basic Aviation Training Device (BATD). The more advanced version is called, appropriately, the Advanced Aviation Training Device (AATD). But the term FTD is still used as well.

The classification of an FTD and how it can be used in flight training depends on the letter of authorization given it by the FAA. Regulations governing the use of these devices appear in 14 CFR parts 61, 141, and 142.

Let's sort this out in a way that is relevant to your private pilot flight training:

* You can play with FSX and similar programs at home on your PC. Unless your particular setup is specifically authorized by the FAA, no time will count toward your training requirement.

* Even with an approved FTD, the training time only counts if it's provided under the supervision of a CFI.

* At best, you will be able to apply only a small number of FTD hours toward your private pilot certificate requirement.

Even if the hours don't count, using an FTD with your CFI might help you in some limited ways. But it is certainly not essential.

FTDs play a much bigger role in instrument flight training. You can count more hours toward your IFR rating. After you get the IFR, you can actually meet some of your currency requirements using an approved FTD at home—by yourself. This is big deal, although you have to spend around $8,000 for the convenience.

Whatever your financial situation, I would caution against spending a lot of money on a home FTD before you get your private pilot certificate. At this stage in your training, you need to be flying a real airplane. Besides, by the time you might actually benefit from an FTD, better models will appear and prices will come down even further.

Flying Solo

One of the greatest moments in my life is when I took off in an airplane by myself for the first time.

Spoiler Alert Believe it or not, your first solo comes fairly early in your training experience. Some people solo after 10 hours. But don't let this become a measure of your worthiness as a pilot. You're ready when you're ready, and that's for you and your CFI to decide.

I remember when my CFI, Robert, signed me off for my first solo. We were sitting on the patio of the FBO. Robert casually asked for my logbook, then opened up the back and started writing in it. I thought I had done something wrong.

"So give me three full-stop takeoffs and landings," he said.

OMG! This was truly a surprise because, unlike you, I didn't know what was coming next in my flight training.

When Robert handed me the logbook, I never felt more respect and admiration for a person. My life and his career were on the line. Even now, I can barely fathom the awesome responsibility that the solo signoff entails.

Thank you, Robert. I will always remember you for this.

After your first solo, you're given an ever longer leash. You solo to a towered airport. You solo to other airports to build the required time. Finally, you solo to what seems to be a faraway place, you land, and you fly back. This is your cross country. Each new step requires an endorsement from your CFI, which may come with time and weather restrictions.

The minimum age to fly solo with a student pilot certificate is 16.

When you've met your solo and other requirements, you're ready to be examined by the DPE. More on that later.

Challenges

We've talked about what is being presented to you in private pilot training. Now let's change our perspective and focus on you. Assuming that you are not a machine, you will experience a kaleidoscope of feelings and emotions.

These challenges will result from what's inside you, and from your reaction to external pressures. Coaching yourself through them is as vital to your success as learning aeronautical knowledge and flying skills.

Fear

Fear is the most fundamental of human emotions. It's hardwired to the base of our reptilian brain. It's about survival.

I had my first encounter with this kind of visceral fear when I took a rock climbing course.

There you are, hands wedged in the crack of rock, a hundred feet off the ground. Your cerebral cortex orders your foot to extend laterally and smear against a tiny dent in the wall. Nothing happens. Fear has gripped your limbs. Your reptilian brain will not allow you to move in unnatural and risky ways.

But you are not a reptile. You can reason with yourself. So you tell yourself you've done this a dozen times before, and that you can do it again. As this inner dialogue proceeds, your joints loosen up, and through an act of sheer will, you extend your foot and transition to the next hold.

As a beginning pilot, you will experience two kinds of fear.

There's the generalized fear that wakes you up at two in the morning after dreaming about a bad landing.

Then there's the visceral fear that grips you when your instructor tells you to pull back on the control wheel until the airplane goes into a stall. You hesitate. "What if it flips over!" your reptilian brain screams.

Fear is not all bad. My DPE made an interesting comment as we walked to the airplane for the private pilot checkride. "It's okay to be a little scared, a little nervous. That's what keeps you sharp. You never want to fly without that edge."

Fear is something you learn to manage. You do that through knowledge, training, and experience.

Knowledge gives you factual information. You learn the performance characteristics of the airplane. You learn what causes problems, how to avoid them, and how to handle them.

Training applies knowledge to real-world situations, under the guidance of an experienced instructor. You see firsthand what to do and how to do it correctly.

Experience bakes in your knowledge and training. You develop awareness and deeply ingrained patterns of behavior. That combination keeps you out of trouble, and helps you respond immediately when something goes wrong.

No amount of training will prepare you for every bad thing that can happen in an airplane. You will always have a certain apprehension. It's the price you pay to fly.

Still, fear should never be overwhelming or incapacitating. If you feel an urge to medicate your fear of flying, or an unwillingness to try new maneuvers, have a heart-to-heart talk with your CFI. Don't quit at the first sign of fear. But

do honor your gut feelings if they are telling you to slow down, stop, or move on. Flying is not for everyone, and sometimes you don't find out until you've tried it.

Fatigue

Flying an airplane is an intense physical experience.

You are naturally tense because of the challenges, stresses, and responsibilities you bear as a pilot. You don't feel this tension while you're flying, but it catches up with you later on. A stiff neck, lower back pain, and aching joints are not uncommon, especially if you're over 35.

Manipulating an airplane's controls requires a moderate amount of strength and a high level of physical coordination. Like a church organist, your hands and feet work together. The airplane's automated control systems help reduce this workload. But you're still fully engaged.

Maintaining a level of alertness and situational awareness can also be fatiguing. As a pilot, you're always "on." The effects of this heightened sensitivity aren't felt until after you're done flying for the day.

Fatigue accumulates the more frequently you fly. And therein lies the rub. You want to fly often enough to maintain progress. But if you push too hard, you'll start to burn out. Let me warn you now that the proper balance will fall somewhere outside your comfort zone.

Your stamina—the resources you bring to offset the fatigue of flight training—will be affected by whatever else is going on in your life. Factor in your work, your family, and your other obligations. If you show up tired before your lesson starts, chances are you're already burning out.

And let's not forget your age. You may be a spry 55, but that's not the same as 25. The older you are, the more demanding flight training will be for you. On the other hand, if you've reached a point in life when you can control your own calendar, you have the ability to schedule in enough downtime to recuperate. Just be careful not to dial back too much. You still have to push yourself.

The antidote to fatigue is simple but true. Get plenty of sleep. Manage outside stress. Eat healthy foods. Exercise. Cut back on or eliminate intoxicating substances. Most important, don't start training until you have the time to devote to it. Better to wait a season than burn out your body and burn up your budget on a stressful and potentially failed attempt.

Overload

We've addressed the emotional and physical challenges of flight training. Now let's talk about what happens when too much information gets crammed into your head in too short a time.

You're learning on multiple levels: aeronautical theory, rules and regulations, mechanical and performance characteristics of the airplane, and the actual experience of flight.

Along with too much information, emotional and physical challenges can inhibit the efficient functioning of your brain. Your capacity to absorb information is also influenced by your age, health, education, intelligence, and overall fortitude.

That's is why it's so important for you to control the pace of your progress. You have to know when to throttle back. Sometimes all you need is a couple of days off. Or some fun flying. Tell your CFI you want to grab a $100 hamburger. He or she will know exactly what you mean.

You also need to study effectively. Schedule study sessions, don't just squeeze them in. Set up personal deadlines and checklists. Managing your time is key to taking ownership of your training progress.

One thing that helps ease the pressure is to anticipate what's coming next in your training. Work backward from the private pilot practical test checkride and break out the milestones. Review your progress on a regular basis.

Another way to reduce overload is to get clear on what's important to learn versus what's nice to know. If you have the bandwidth, soak up all the nice-to-know you can handle. But always put the need-to-know items first on the list.

In the beginning, it's hard to prioritize. I recommend that each time you take up a new knowledge area, like weight and balance, review the section about it in the ASA or Gleim knowledge test handbook. These books have great summaries with actual test questions that appear on the written exam. This is the stuff you have to know. Use it as a foundation, then add more information as your capacity allows.

Delay

Life happens. Something comes up at work. There are family issues. Money gets tight—a subject we'll address in the next section. The school where you're training goes out of business.

I personally have experienced all of the above. Each was unexpected. Each required some adjustment to keep my progress on track. In fact, even today as I work on my instrument rating—and write this book—I'm juggling a lot. It's a never-ending process.

Sometimes life requires you to put your flight training on hold.

The impact of delays depends on their length. The shorter ones are easier to manage. If it's a month or so, you're not going to lose too much momentum. Longer than that, and it can feel like starting all over again.

In the Proficiency section, we look at ways of staying engaged when you're grounded. Much of this advice applies to a student on hold.

As with fat on a bear, the more hours you have, the longer you can hibernate. High-hour pilots can handle downtime better. Delays are most harmful to students early in training. That's one reason why you don't want to start training until you have a reasonable chance of completing it. As mentioned earlier, sometimes it's better to wait a season and do it right.

Do what you can to help prevent delays. Pick a good school. Pick a good CFI. Pick the right time in your life to train. These three steps alone cover about 75 percent of delay downtime risk.

Budget

Not counting delays, you control your cash flow by the training choices you make.

You should not start flight training if you don't have the money to pay for it. That seems pretty obvious, but there are those who rely on faith more than planning. They are the same people who think there's just enough fuel to make it to the airport—even though a simple calculation would reveal a two-mile discrepancy. So close but yet so far, and so fatal.

I keep two Excel spreadsheets. One is the electronic version of my logbook. The other tracks airplane and instructor fees. I enter charges and payments, and it calculates a running balance. I have an accounting of every penny I've spent on flying from day one.

Whenever I rent a plane or take a lesson, I get a printed invoice from the flight school. Then when I get home I compare their balance with mine. I normally carry a small credit balance to get the cheaper block rates.

If money gets tight, there are two things you can do. First, make sure every lesson is well structured. Second, space the lessons out a bit. Keep in mind that the longer your training takes, the more the overall cost will go up. But if you stop altogether, you'll spend even more money to get back up to speed. So if you're working through a cash flow problem, slowing down might be the lesser of two evils.

Worst-case scenario, meet with your CFI and explain that you need to go into maintenance mode for a while. Space out a series of short lessons where you do pattern work and basic maneuvers. Then use the techniques discussed in the Proficiency section to stay mentally engaged. This is better than stopping cold.

In the previous section, I suggested the best way to prevent delays is to pick a good school, pick a good CFI, and pick the right time in your life to train. The same advice applies to optimizing your flight training budget.

Your Flight School

My impression is that a winnowing process is going on in the flight training industry. Some of this is due to economics, but another influence is the growing insistence on professionalism from a class of students who are professionals themselves.

We can only hope this trend continues, but not to the point that flight schools become extinct. If that were to happen, only wealthy students with their own airplanes and independent instructors could learn to fly.

I don't know how they survive, but there still are flight schools hanging on in various enclaves. For the most part, these are stalwarts of GA.

You still must apply due diligence when selecting a flight school. Even with the good ones, you will experience a certain amount of frustration. Their efforts to survive can put their agenda at odds with yours. It's just a fact of life.

In the worst-case scenario, airplanes get switched and flights get canceled unexpectedly. CFIs come and go. Maintenance gets deferred.

The best you can do in this situation is to manage your budget and schedule closely. Insist on having a clearly stated curriculum and know the status of your progress at all times. Stay informed about CFIs and airplanes. If you need to make a change, make it after careful deliberation.

Most important, have a bottom line. It's better to put off your dreams for a year or two, than to have a really bad training experience. If learning to fly an airplane means a lot to you, move to an area where there's a good school. Or consider an extended stay at that location.

Odds are your experience with a flight school will be good. Most of the bad flight schools are no longer in business. As long as you know how to protect your interests, you'll be fine.

Your Instructor

The multidimensional relationship you have with your CFI is central to the quality of instruction you receive, and your eventual success with flight training.

On the one hand, your CFI is a service provider to whom you're paying a fee. On the other hand, your CFI is a teacher and authority figure on whom your life and safety depend. Kind of like a consultant. Kind of like a parent. Kind of like a coach. But different from all of these.

Your CFI may be your age, younger, or older. Each scenario has unique dynamics. Although a professional aviator, your CFI may not have the same income, education, and background you do. All of these factors affect the style and substance of your communication. As with any relationship, you have to work it out, or move on.

First, do your part to learn everything you can from this person. Adapt to your CFI's personality and teaching style as much as possible. Check your ego at the door. Be open and teachable. Let your CFI manage the process.

Second, assume responsibility for your training progress. Insist on a curriculum. Be clear on what part of the curriculum is being covered in every lesson. Feel free to ask questions, but pay for the time your CFI takes to answer them. You don't work for free, and neither should your CFI.

Show your CFI the respect he or she deserves for becoming an aviation professional. The more experience you gain, the more you will appreciate the level of effort and accomplishment involved in becoming a CFI.

That said, never hesitate to address a concern. A good CFI will create an open atmosphere. If your gut says something isn't right, respect that feeling and act on it. It's your money. You're the client. You can make a change whenever you want.

As far as making changes, the decision to do so must be carefully thought through. In any area, there are only so many flight schools and CFIs. By the time you get to marriage number five, people might rightly question your relationship stability.

Be cautious in selecting a CFI, and then do everything you can to make the relationship work. That's my advice.

The System

The sad fact is that most student pilots fall through the cracks. No one calls them from FAA headquarters in Washington, D.C., and asks, "What's up? How can we help?"

For better or worse, the American system is one in which you have to fend for yourself. In the end, it's all up to you.

As you contemplate whether to become a pilot, and whether to endure the rigors of the flight training process, I strongly encourage you to know why you're doing it.

The "why" doesn't have to be for any practical reason. But I suggest that it be connected to a passion, a true love of airplanes, aviation, and flight.

In the times when you feel the most stressed and challenged, passion is what keeps you going.

On to the Finish Line

You will face many challenges in the course of your flight training. But the good news is that you can overcome them.

Here are some suggestions to help you carry on:

* Befriend your fellow flight students. You can give each other a lot of support.

* Have a plan and follow it.

* Pace yourself.

* Every once in a while, just fly for fun.

* Hang out at the school and your friendly FBO. Absorb the culture of aviation.

* Meet some experienced pilots. Listen to their stories.

* Offer to help wash the airplanes. You learn a lot doing that. (Wax-on, wax-off.)

* Act as if you're training to become a commercial pilot. Set a higher standard from the start.

You're also welcome to contact me through my website, tedseastrom.com. I'm not a CFI and I can't give you expert advice. But I'm always happy to offer encouragement to a student pilot.

So that's it for flight training. Now it's time to take your tests and get your ticket.

Private Pilot Certificate

You're done with flight training. The next steps are to (1) confirm that you've met the eligibility and training requirements, (2) take your exams, and (3) get that private pilot certificate.

Eligibility

You don't want to reach the end of your flight training, only to discover that a critical element is missing.

After you've had a few lessons, you should develop your own checklist of training and test milestones. The last thing you want is a mad scramble at the end to fill in missing pieces. This confusion will disrupt your learning process and add unnecessary stress going into the final testing stages.

In the Initial Requirements section, we looked at what it takes to get started with private pilot flight training. I'm reprinting the full text of the regulation at the end of this section. I haven't done that elsewhere. But I want to emphasize the importance of reading this particular regulation word-for-word. As always, go to the FAA website (faa.gov) to see the most up-to-date version of this or any regulation.

As stated in 14 CFR 61, to be eligible for a private pilot certificate, a person must:

(a) Be at least 17 years of age for a rating in other than a glider or balloon.

(b) Be at least 16 years of age for a rating in a glider or balloon.

(c) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(d) Receive a logbook endorsement from an authorized instructor who:

(1) Conducted the training or reviewed the person's home study on the aeronautical knowledge areas listed in Sec. 61.105(b) of this part that apply to the aircraft rating sought; and

(2) Certified that the person is prepared for the required knowledge test.

(e) Pass the required knowledge test on the aeronautical knowledge areas listed in Sec. 61.105(b) of this part.

(f) Receive flight training and a logbook endorsement from an authorized instructor who:

(1) Conducted the training in the areas of operation listed in Sec. 61.107(b) of this part that apply to the aircraft rating sought; and

(2) Certified that the person is prepared for the required practical test.

(g) Meet the aeronautical experience requirements of this part that apply to the aircraft rating sought before applying for the practical test.

(h) Pass a practical test on the areas of operation listed in Sec. 61.107(b) of this part that apply to the aircraft rating sought.

(i) Comply with the appropriate sections of this part that apply to the aircraft category and class rating sought.

I especially want to call out this requirement: "Conducted the training in the areas of operation listed in Sec. 61.107(b)." These are the required flight training activities and minimum hours. You can very easily miss an item or time requirement in your logbook. But the DPE won't.

Logbook Entries and Endorsements

From the first hour of your flight training, everything you do in an airplane as a pilot will be recorded in a logbook. Some entries you will make yourself. Other entries will be made by your instructors and examiners.

There are FAA regulations covering logbook entries in 14 CFR parts 61 and 91. The logbook is an important document with legal significance. Being sloppy with it or making false entries can get you into a lot of trouble. Your logbook is used to determine your currency as well as your qualification to test for various certificates and ratings.

Before we go any further, I highly recommend you set up an Excel or similar spreadsheet to match your logbook. It's a good crosscheck on the accuracy of your totals, and it may be the only backup you have if you ever lose your logbook. At a minimum, make photocopies.

By the way, it's your logbook. Not the school's. Keep it with you.

All of the early entries will be made by your CFI, summarizing where you went and what you did. Across from each entry will be a set of columns, with numbers entered under various categories.

The CFI's entry into your logbook is accompanied by her or his signature, certificate number, and date of expiration. Double-check all entries. I had one CFI who always entered the wrong flight date.

In addition to the line entries, your CFI will enter, sign, and date separate endorsements. Each endorsement gives you permission to do a specific thing, sometimes under limited circumstances. For example, you need an endorsement:

* The first time you fly solo.

* For your solo cross-country.

* To be permitted to take the private pilot knowledge test (aka written exam).

* To take the private pilot practical test, which includes an oral exam and flight test.

In some circumstances, endorsements are like ratings. You get an endorsement to fly a high-performance airplane, such as a turbocharged Cessna 182, which exceeds 200 hp. You get an endorsement after your flight review to retain or regain currency.

The nice thing about endorsements is that there's no specific test. There may be regulatory training requirements, but once they're met to the satisfaction of your CFI, you get "signed off."

Private Pilot Knowledge Test

Referred to as the "written exam," the private pilot knowledge test is the first step in the FAA examination process. The requirements are listed in 14 CFR 61. The test covers fundamental regulatory and aeronautical information:

* The FARs that relate to private pilot privileges, limitations, and flight operations

* Accident reporting requirements of the NTSB

* Use of the AIM and FAA advisory circulars

* Use of aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems

* Radio communication procedures

* Aviation weather reporting and analysis

* Aircraft operation

* Effects of density altitude on takeoff and climb performance

* Weight and balance computations

* Principles of aerodynamics, powerplants, and aircraft systems

* Stall awareness, spin entry, spins, and spin recovery techniques

* Aeronautical decision-making and judgment

* Preflight action, which includes obtaining information about your intended flight and planning for alternatives

You learn this information from one or more of the following: taking a structured ground school class, using a home-study course, reading FAA books, or receiving direct instruction from your CFI.

There is no requirement about how this knowledge gets into your head. Your CFI simply has to give you an endorsement—sign you off—before you are permitted to take the test. My CFI's requirement was that I score at least 90 percent on three practice written exams. Which leads to our next point.

You have two separate albeit related goals here. One is to learn the aeronautical information. The other is to pass the FAA test. You might know everything yet still bomb the test. To pass the test, much less do well on it, you have to prepare specifically for the experience of taking the test.

That's where exam prep comes in. There are numerous providers of simulated FAA private pilot knowledge tests. The secret sauce of these exams is that they use real questions from the test's question pool, much of which the FAA makes public. They also use the format and timing of the actual tests.

For a fee, you can take these prep tests over and over again, and keep doing so until your score squeaks past the minimum 70 percent passing grade. If all else fails, you can keep practicing until you memorize the questions and all possible answers. Although if you're smart enough to do that, you might as easily learn the material. But I do not judge.

Well, if this sounds too good to be true, it is. Since the time I took the written exam, the FAA decided to tighten things up a bit. A fairly significant percentage of the questions are not made public. Which means you can do all the test prep in the world but still encounter material you've never seen before. The FAA is trying to raise the bar and make sure pilots actually know something.

The exam is not open-book. You take it at a certified testing center under strict scrutiny. You can practice the test on your laptop right up until the time you enter the center. But you can't take anything in with you, other than the trusty E6B, an electronic calculator (with limited functions), a plotter, paper, and a pencil.

My advice: Start studying for your written exam early on. As a baseline, take one of the prep exams. You will flunk it badly. But take it again every couple of weeks, and you'll see the score start to rise. Get used to taking the test. Learn the information incrementally. Build knowledge and confidence through repetition.

I also recommend getting a test prep manual from ASA or Gleim. As with the online prep tests, these manuals have sample questions. For an added benefit, they discuss the answer options, which really helps. They also provide

excellent summaries of key knowledge areas—which is a guide to the basic, foundational information you need to know.

After you pass the written test, you're not entirely out of the woods. When you take the private pilot practical test, the DPE gives you an oral exam that covers much of the same material. We talk more about the oral in the Practical Test: Oral section.

Designated Pilot Examiners

At the end of your flight training, after you have met all of the requirements, received the necessary endorsements, and passed the private pilot knowledge test, you're ready for the private pilot practical test. This is the last step between you and the private pilot certificate.

The person who will administer that test most likely will be a Designated Pilot Examiner (DPE). This is a private contractor, a pilot with extensive flight experience who is authorized to serve as an examiner on behalf of the FAA. DPEs charge a fee, which at this time is between $350 and $500, cash. If you fail the test, you pay an additional and perhaps smaller fee to retake the portions you failed.

You can ask for an FAA examiner—but the odds of getting one are slim. There currently is no fee. The difference is you take the exam at the FAA's convenience, perhaps weeks down the road. And you will receive one of the more thorough private pilot practicals administered that day.

We'll get into the details of the practical test in the next two sections. Right now, let's take a step back and look at the overall experience with the DPE.

It is said that most DPEs start the test with the intention of passing you, unless you give them a reason not to. Most DPEs are senior pilots and seasoned instructors who love and want to promote GA.

But DPEs are human. They can have a bad day like anybody else. Plus, the FAA would look askance at them if their pass rates were 100 percent. Some students are clearly unprepared, and failing them is a no-brainer. Certainly you won't be one of them.

On the downside, nobody wants to see the word "FAIL" printed boldly in a logbook entry. You wouldn't have taken the test if you and your CFI didn't think you were ready. So the fact that you failed means something went wrong. Or maybe you had a brain spasm and made an unforgivable mistake.

On the upside, most people pass the first time. Most people have a positive experience and say they actually learned a few things. If you do fail, it may be on a portion of the test. Often a retest of the failed items can be scheduled shortly after a review with your CFI.

The question naturally arises, can or should you "shop" for a DPE? Talk about a gray area. Let's see if we can break this down.

Most schools have DPEs they work with on a regular basis. Odds are you will use one of those examiners. What makes them desirable from the school's standpoint is not their pass rate, but the fact that they are available when needed.

As private contractors, DPEs are more flexible, which can make a big difference if you're on a tight schedule. You hope that the schools only work with DPEs who conduct themselves in a professional manner. Moving further into the gray, schools might have an idea of what the DPE expects or emphasizes.

Beyond that, I don't know. If you find that you have to game the system to pass, please give it up. Some people shouldn't become pilots.

So here's how I feel about DPEs:

I've invested a lot of time, money, and effort. I want a fair examiner who's having a good day. I have a right to know who will examine me and inquire into her or his background. If I'm not qualified, I want to fail—for my safety and everyone else's. If I am qualified, I deserve every reasonable chance of success.

Private Pilot Practical Test

The private pilot practical test is the "final exam" on your way to becoming a private pilot. It is one test with two components. Typically, they are treated as two separate tests.

The oral exam occurs on the ground first. Then you take the flight test, assuming you've passed the oral. Be aware that the DPE will ask you more "oral" questions during the flight test portion of the exam.

As with the knowledge test, your CFI must give you an endorsement ("sign you off") to take the practical test. Note that the endorsement is valid for a limited period of time.

Practical Test: Oral

Don't panic, but the oral exam portion of the private pilot practical test can take one to two hours, or more. However, the setting is informal and friendly.

Before the oral exam begins, the DPE will check your logbook and other paperwork to make sure everything is in order. One required item is an envelope with the DPE's name on it and cash inside it.

The DPE will ask to see the airplane's registration, airworthiness certificate, and maintenance logs. You need to be able to go through the logs and show the DPE that all required inspections and maintenance items, including special maintenance advisories, are current.

Then the oral exam begins. It's not a written exam in oral form. The emphasis is on the practical application of aeronautical knowledge to real-world situations.

Here's a typical question the DPE might ask: "You're landing behind a big, heavy jet. Where should your touchdown point be?" Get that answer wrong, and you'll spend the next 10 minutes talking about wake turbulence.

You'll be asked about regulations. Some things you're expected to know, other stuff it's okay to look up. In fact, some questions are designed to see if you know how to find the relevant regulation.

"How often does the ELT have to be inspected?" Look it up at 14 CFR 91. You might want to have this kind of information tabbed in your copy of the FAR/AIM.

There will be many scenario-based questions. "What would you do if your radios went out?" "Tell me how you would make a go/no-go decision under such-and-such weather conditions."

You aren't expected to answer every question perfectly. If you're getting most of the questions right, the DPE will probably nudge you back on track when you go astray.

The general consensus is that if you nail the first few questions, you will have a shorter oral exam. If it's clear you're not prepared, you will field a slew of aviation trivia questions. This happened to one guy I know, who actually had to retake his oral.

Before the oral exam, the DPE will ask you to prepare a flight plan for a cross-country trip. You have to check the weather before the oral and present the flight plan as if you're taking that trip that day. In fact, the first part of your flight test may be based on that flight plan. (Don't forget to ask, tactfully, the DPE's weight for the weight and balance calculation.)

During this phase of the oral exam, the DPE will ask you all kinds of questions about why you chose a particular route, how you picked an alternate destination, and so on. This is also an opportunity for the DPE to quiz you about symbols and other items on the aeronautical chart.

A word to the wise: Chart knowledge is best learned along the way. You can't cram it two days before the oral.

At some point—hopefully within the first two hours—the DPE gathers up her or his stuff and says, "Let's go fly." That means you passed the oral exam.

So how can you specifically prepare for the oral? Here are my suggestions:

* Whenever you learn a new concept, ask yourself what the practical application might be. You may not have the answer. But asking creates a bucket you can fill later.

* Actually try to learn the material covered by the written exam.

* Try to get 90 percent or above on the written exam. A barely passing score ensures that you will have a feisty oral.

* Get the ASA Private Oral Exam Guide. Use it for review—but remember that the oral is scenario-based, not a quiz you prepare for by memorizing facts.

* Have your CFI or someone else at the flight school give you a practice oral exam.

* Go online and find written excerpts of oral exams. You can also purchase mock orals in audio and video form.

The bottom line with the oral exam is not to memorize a bunch of stuff. Try to anticipate the kinds of questions you'll encounter, and think through how you want to answer them.

Practical Test: Checkride

The flight portion of the FAA private pilot practical test is known as the checkride. If you pass it, you're done and you get the private pilot certificate. If you fail, you go back a step.

Everything you do in flight training leads to this moment. The FAA is going to climb into an airplane with you and decide if you're worthy of being a pilot. It doesn't get more intense than that.

You might know your stuff and still fail the checkride. As with the written and oral, you have to take specific steps to prepare for it.

First, there should be no surprises. Everything that could be asked of you on the checkride is covered in the Private Pilot Practical Test Standards (PTS). As you break down the PTS, you'll recognize many of the basic maneuvers you learned while developing your stick and rudder skills. Much of the checkride consists of executing these maneuvers within established performance criteria.

You'll probably fly the initial portion of the flight plan that the DPE asked you to prepare. There's a good chance you'll be asked to handle a deviation from this flight plan. That means you might be asked to pick a new destination and chart a course to it while in the air flying the airplane. The DPE wants to see how flexible you are at handling a situation you will likely encounter as a private pilot.

You're expected to know basic emergency response procedures. You've practiced these before. Nothing new.

So here's what shakes things up a bit: The DPE gets to pick the order of test items. That means you may be getting ready to turn base and the DPE pulls the power, unexpectedly, and asks you to execute a short approach landing. Or just as you're getting ready to make a normal landing, the DPE says—right before you touch down—"Let's do a go-around."

Your oral exam starts on the ground, but it isn't over yet. The DPE may ask you questions while you're flying, questions that may be completely unrelated to what's happening that moment. "What are the rules for supplemental oxygen?" "What equipment is required to fly through class B airspace?"

Now this is when it gets interesting, because something else might be going on. At selected points during the checkride, the DPE will intentionally try to throw you off your game. He or she may drop a pencil and ask you to pick it up. Or engage you in friendly, distracting banter.

It's at that point you realize you're been flying 300 above the assigned altitude for quite a while. And then you hear those dreaded words:

"Well, Charlie, I'm afraid I'm not going to be able to pass you today. Would you like to keep flying and see how you do on the other parts of the test? Or would you prefer to return to the airport and start over another day?"

Distractions or not, you can hear these words at any point during the checkride when it's clear to the DPE you have blown a portion of the checkride. Or when you scare the DPE enough that he or she has to take control of the airplane.

In a moment, we'll look at your options when you've failed the checkride.

But about those distractions. You're supposed to keep your focus on important things at important times. For example, the FAA insists on a "sterile cockpit" when on approach to landing. That means no chitchat.

You are PIC during the checkride. If the DPE is distracting you when you need concentrate on a flight maneuver, say something like, "Excuse me, Joe, but I need to focus on making this turn." And that, my friend, is exactly the right answer to the DPE's intentionally distracting question.

A word of caution—you are expected to answer questions when conditions permit. The DPE will know if you're making lame excuses.

So what happens if you fail the checkride?

You have a blemish in your logbook. Fortunately, you can retake all or part of the checkride. You reschedule, practice the failed parts with your CFI, pay more money, and retake the test. Aside from embarrassment and inconvenience, it's not the end of the world.

Many excellent pilots have failed some portion of a checkride along the way. Sometimes you have a brain spasm. Sometimes you get a cranky DPE. Try to keep things in perspective.

A string of failures and retakes in your logbook will limit a professional aviation career. But most private pilots stay private pilots. So a failure and retake are embarrassing, but that's it.

Just so you don't get completely freaked out, keep in mind that:

* Most DPEs start the checkride saying they expect to pass you unless you give them a reason not to.

* You don't have to be perfect. What matters is that you catch yourself going off-track and fix it right away.

* You might be able to stop and restart a badly executed maneuver. Ask the DPE before flying if this is permitted.

* You can prepare for the checkride. This doesn't have to be a crapshoot.

So what specific steps can you take to prepare for the checkride? Here are my suggestions:

* Do your homework. Starting reading the PTS a few weeks after getting started. You can get it for free on the FAA website (faa.gov). A lot of the terms won't make sense in the beginning, but that's okay. Try to wrap your brain around these requirements and keep them fresh in your mind throughout your training.

* Get the best flight instruction your location, time, and budget allow. Insist on, and follow, a structured curriculum. Know where your knowledge and skill levels are relative to the PTS at every stage of instruction.

* Have a CFI you've never flown with give you a mock checkride.

* Go online and find audio and video recordings of simulated checkrides.

Don't overdo it. But do what you need to do to feel prepared.

Finally, let go and let God.

If the professionals think you shouldn't be a pilot, respect their judgment. And be proud. You have tried something few people have done. You've had some incredible experiences. As long as you give it your best shot, you can move on without regret.

Now You're a Pilot

As you taxi back to the ramp after your checkride, the DPE smiles and says, "Good job. We have a new pilot today."

Congratulations! You passed the private pilot practical test.

The DPE prints out a temporary private pilot certificate. The real one comes later in the mail. It's a beautifully designed card. The FAA logo, your name, the private pilot certification, and the ASEL rating are printed on the front. On the back is a classic image of the Wright brothers.

You are now connected to the very origins of modern aviation. You share a heritage with everyone who is, has been, or will be a pilot.

As hard as your flight training was, it was worth it. Not only have you become a pilot, you've learned something about yourself: You can embrace a dream from childhood and make it real. You can take on a seemingly impossible quest and be transformed.

What happens next?

You fly. And to keep flying, you need to stay current and proficient.

After you catch your breath, you might decide you're ready for a new challenge and seek additional endorsements, ratings and certificates.

Currency

Currency is a legal requirement. Sometimes people use the term "currency" to mean "proficiency," which is discussed in the next section.

As you get additional ratings and certificates, currency requirements become more stringent. At the private pilot level with only the ASEL rating, currency requirements are less restrictive.

Generally speaking, your private pilot certificate never expires. But to continue flying, you need a current medical certificate, and you need to be current as required by 14 CFR 61.

One aspect of currency is about being allowed to carry passengers. There are separate requirements for day and night flight based on how many and what types of landings you've performed in the past 90 days. If you're not current in this area, you can fly by yourself or with another pilot, but not carry passengers. You get passenger-current by performing the required landings.

The other aspect of currency is about having your flight skills reviewed on a regular basis. If you get no further flight training leading to a certificate or rating, then you need a flight review every two years. The flight review is not a practical flight test with a DPE. It's basically a short refresher with a CFI. See 14 CFR 61 for the details.

Proficiency

Proficiency is how sharp your flying skills are at any given time. You may be current and legally allowed to fly or carry passengers, but that doesn't mean you'd be safe to do so.

When you're starting out, your skills can degrade quickly if you fly infrequently.

If too much time elapses, it can be hard to get back into flying at all. This is the point at which many private pilots quit flying. The prospect of essentially starting over is overwhelming.

For budget or other reasons, you may have to slow down or stop flying for a while. If that happens, do whatever you can to keep engaged in aviation. Here are some ideas:

* Read the aviation magazines.

* Methodically reread your training materials. Retake the online course.

* Hang out at the airport and talk with pilots. My favorite FBO has a patio next to the ramp. It's heavenly sitting there with an iced tea and listening to radio calls on my aviation radio.

* Speaking of radios, check out liveatc.net. You can listen to radio calls from airports across the United States and around the world.

* Use a home FTD, although I have mixed feelings about this. See the Flight Training Devices section for more information.

* Hang out at the flight school. Who knows, if you wash a few planes they might give you some flight time.

* Start an aviation club in your area.

* Attend FAA safety classes at local airports.

* Get certificated to teach ground school.

You get the idea. Keep those buckets polished and fill them with new information.

To the extent you can, try to fly at least once a month—even if it's just to do pattern work. This won't keep you fully proficient, but it will engage you enough to prevent a full mental shutdown.

If your proficiency does fall beyond the point you can fix it by yourself, then you need to get some refresher training with a CFI. I would go a step further and suggest you fly with a CFI once in a while to make sure you're staying sharp. Even the star players need a coach.

Remember that part of preflight planning is evaluating yourself. Every time you get into an airplane, you should be both current and proficient.

Additional Endorsements, Ratings, and Certificates

This book focuses on the private pilot certificate. Most private pilots stay at that level. It's your ticket for fun and adventure and is quite enough on its own. Other than dodging bad weather, you can pretty much go wherever you want, whenever you want.

You can enhance your private pilot certificate with endorsements.

Endorsements give you permission to do a specific thing. You don't have to take a flight test with a DPE. You are "signed off" by a CFI after you've received the necessary training. You can get an endorsement to fly a:

* Tail wheel airplane

* Complex airplane (has landing gear)

* High performance airplane (more than 200 hp)

There are ratings and certificates beyond the private pilot ASEL.

Ratings are like add-ons to your private pilot certificate. Additional ratings:

* IFR, to fly in IMC

* Multiengine, to fly an airplane with more than one engine

* Sea rating, to fly an airplane with floats and land on water

Certificates define classes of privileges and responsibilities. Additional certificates:

* Commercial, to get paid for flying an airplane

* CFI, to become an instructor

* ATP, to become an airline transport pilot

A fair number of private pilots go on to get the instrument rating so they can fly IFR.

The ASES—Aircraft Single Engine Sea—is a rating you can get right away. It takes only a few days to a week at most. You might be surprised to find a CFI offering this training at a nearby lake or river. For a real adventure, sign up for a seaplane travel/training package in Alaska.

Some private pilots like to get the multiengine rating. The challenge here is that there aren't many multiengine training airplanes around. You can get your multi before you get your IFR. That way you only have to take one IFR checkride. This is the route some of the aviation academies take when training commercial pilots.

Stepping up to the commercial certificate allows you fly for hire. It also sharpens your flying skills even more. You can get the commercial right after the private—before the IFR. Although doing so puts restrictions on your certificate, which kind of defeats the purpose.

After the commercial, and with enough hours, you can be hired as a professional pilot. The trick is getting those hours. One way is to become a CFI.

A lot of pilots on a commercial track become CFIs to build hours. We looked at this situation in the Certificated Flight Instructors section. Note that you can also get certificated to teach ground school without becoming a full-fledged CFI.

Apart from these endorsements, certificates, and ratings, there are a host of type ratings. A type rating is based on a specific type of high-performance or specialty airplane, like a Boeing 747. Really experienced pilots who've "done it all" have multiple type ratings.

For a detailed discussion of the requirements and privileges associated with endorsements, certificates, and ratings, see the FAA regulations in 14 CFR Part 61.

Slipping the Surly Bonds of Earth

I leave you with this classic ode to flight:

Oh! I have slipped the surly bonds of earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
Of sun-split clouds—and done a hundred things
You have not dreamed of—wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air.
Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace
Where never lark, or even eagle flew—
And, while with silent lifting mind I've trod
The high untrespassed sanctity of space,
Put out my hand and touched the face of God.

—"High Flight," John Gillespie Magee Jr.

Acronym List

A&P
Airframe and Powerplant mechanic

AATD
Advanced Aviation Training Device

ADF
Automatic Direction Finder

A/FD
Airport/Facility Directory

AFM
Airplane Flight Manual

AHRS
Attitude and Heading Reference System

AIM
Aeronautical Information Manual

AME
Aviation Medical Examiner

AOPA
Aircraft Owners and Pilots Association

ARTCC
Air Route Traffic Control Center

ASEL
Airplane Single Engine Land

ATC
Air Traffic Control

ATIS
Automatic Terminal Information Service

BATD
Basic Aviation Training Device

CAB
Civil Aeronautics Board

CFI
Certificated Flight Instructor

CFR
Code of Federal Regulations

COM
Communications, as in COM radios.

CTAF
Common Traffic Advisory Frequency

DME
Distance Measuring Equipment

DOT
Department of Transportation

DPE
Designated Pilot Examiner

DUATS
Direct User Access Terminal Service

EAA
Experimental Aircraft Association

FAR
Federal Aviation Regulation

FBO
Fixed Base Operator

FMS
Flight Management System

FSDO
Flight Standards District Office

FSS
Flight Service Station

FSX
Microsoft Flight Simulator X

FTD
Flight Training Device

GA
General Aviation

GPS
Global Positioning System

IFR
Instrument Flight Rules

ILS
Instrument Landing System

IM
Information Manual

IMC
Instrument Meteorological Conditions

LCD
Liquid Crystal Display

LORAN
Long Range Navigation

NAFI
National Association of Flight Instructors

NAS
National Airspace System

NDB
Non-Directional Beacon

NOTAM
Notice to Airmen

NTSB
National Transportation Safety Board

NWS
National Weather Service

OBS
Omni Bearing Selector

PAVE
Pilot-Aircraft-Environment-External

PCATD
Personal Computer Aviation Training Device

PIC
Pilot-in-Command

POH
Pilot's Operating Handbook

PTS
Practical Test Standards

SIM
Flight Simulator

TRACON
Terminal Radar Approach Control

TSA
Transportation Safety Administration

VFR
Visual Flight Rules

VOR
Very High Frequency Omnidirectional Range